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#### Abstract

Nowadays, transparency and digitalization of actions in the whole supply chain are emphasized and firms are demanding visibility to better forecast, plan and control the flow of goods. The expectations towards fully real-time traceable cargo flow are high and logistics service providers are recommended to digitize their actions to stay in the highly competitive freight transport markets. When it comes to technology, it has been developed rapidly and can provide very sophisticated solutions to enhance visibility. Information flow is a key for visibility. Therefore, information and communication technology (ICT) is vital to enhance visibility. However, technology alone does not enable visibility. It requires collaboration with other involved actors in the transport chain. Multimodal maritime container transport chains are complex in a sense that they require deep collaboration in a form of IT-compatibility with vast number of players involved within the carriage of goods to enhance seamless and automatized exchange of information. It has been disclosed that the biggest logistics service providers have already been able to form such collaborative relationships with big shipping lines, for instance. Also, market leaders usually arrange the pre- and end-haulage of the transport with own assets and therefore information flow is advanced.

However, freight transport industry is highly fragmented and majorly consists of small-sized firms. Margins in the freight transport markets are extremely low as customers do not see added value in freight transportation and therefore transportation is seen as an extra harmful cost for firms. Therefore, the idea of big IT-investments and integration of actions with other players is infeasible for some companies.

In this study, visibility in multimodal maritime container transport chains is investigated in a wide sense by conducting semi-structured interviews among different-sized logistics service providers located in Finland. First, the current adoption of visibility is studied, the benefits of it are discussed and the barriers to adopt visibility are discussed. Furthermore, perceptions towards the importance of visibility as a service offering in the creation of competitive strategies are investigated.

Key words	Digitalization, visibility, multimodal maritime container transport chains, logistics service providers, freight markets, collaboration, Information and communications technology
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### Tiivistelmä

Nykyään painotetaan yritysten toimitusketjujen läpinäkyvyyttä ja digitalisaatiota. Yritykset vaativat näkyvyyttä, jotta pystyisivät ennustamaan, suunnittelemaan ja kontrolloimaan tavaravirtaa entistä paremmin. Odotukset rahdinkulun täysin reaaliaikaiseen seurantaan ovat korkealla. Sen vuoksi logistiikan palveluntarjoajia on kehoitettu digitalisoimaan toimintonsa säilyttääkseen paikkansa kilpailuilla rahtimarkkinoilla. Teknologia on kehittynyt nopeasti ja täten mahdollistaa erittäin monimutkaisiakin ratkaisuja näkyvyyden takaamiseksi. Tiedonkulku on välttämättömyys näkyvyydelle, ja sen vuoksi informaatio- ja kommunikaatioteknologia on olennaista näkyvyyden takaamiseksi. Teknologia itsessään ei kuitenkaan takaa näkyvyyttä, vaan se vaatii myös yhteistyötä asianomaisten toimijoiden kesken kuljetusketjussa. Multimodaaliset merikonttikuljetusketjut ovat siitä monimutkaisia, että tiedonsiirto saumattomasti ja automatisoidusti vaatii syvää yhteistyötä, sekä yhteensopivia IT-järjestelmiä laajan kuljetukseen liittyvän toimijajoukon kesken. Tiedetään, että suurimmat logistiikan palveluntarjoajat ovat pystyneet kehittämään yhteistyöhön perustuvia suhteita esimerkiksi suurten varustamoiden kesken. Globaalisti toimivat markkinajohtajat pystyvät myös usein järjestämään multimodaaleihin merikonttikuljetuksiin liittyvät maakuljetusosuudet omalla kalustollaan.

Rahdinkuljetusmarkkinat ovat fragmentoituneet ja koostuvat pääosin pienyrityksistä. Katteet ovat äärimmäisen pieniä kuljetusalalla, sillä asiakkaat eivät tapaa nähdä lisäarvoa tavarankuljetuksessa ja kuljetuskustannukset koetaan haitallisena lisäkuluna yrityksille. Sen vuoksi suuret IT-investoinnit ja toimintojen yhteensovittaminen muiden toimijoiden kanssa nähdään toteuttamiskelvottomina monien logistiikan palveluntarjoajien näkökulmasta.

Tämä tutkimus käsittelee näkyvyyttä multimodaalissa merikonttikuljetusketjussa laajasti. Logistiikan palveluntarjoajia on haastateltu puolistrukturoiduilla haastatteluilla. Tämänhetkinen tilanne näkyvyyden osalta on selvitetty ja sen hyödyistä keskusteltu. Läpinäkyvyyden käyttöönoton esteitä ja haasteita on myös tarkasteltu. Näiden lisäksi on selvitetty logistiikan palveluntarjoajien käsityksiä näkyvyyden tärkeydestä palveluntarjontana kilpailustrategian luomisessa.

Avainsanat	Digitalisaatio, näkyvyys, multimodaali merikonttikuljetusketju, logistiikan palveluntarjoajat, rahtimarkkinat, yhteistyö, Informaatio ja kommunikaatioteknologia
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**UNIVERSITY  
OF TURKU**

Turku School of  
Economics

# **VISIBILITY IN MULTIMODAL MARITIME CONTAINER TRANSPORT CHAINS**

**Logistics service providers' perspective**

Master's Thesis  
in International Business

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03.04.2020  
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The originality of this thesis has been checked in accordance with the University of Turku quality assurance system using the Turnitin OriginalityCheck service.

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# 1 INTRODUCTION

## 1.1 Background of the study

*“We have to embrace digitalization of the market now if we want to survive. The market would not wait for traditional players in the industry to catch up with modern technology”*

- Tim Smith, Maersk’s North Asia Chairman (2017)

The amount of shipped freight is estimated to quadruple by 2050 (Ernst & Young 2018). Sea transport is a dominating mode of transport currently by covering 80% to 90% of all international trade. Seaborne trade faced a panacea already in 1970s and 1980s, when shipping extended from breakbulk to containerized shipping, consequently enabling multimodal freight transportation of standardized containers (UNCTAD 2018, 17). Regardless the popularity of shipping, maritime sector has been in “troubled water” recently even though the worst unprofitable years affected by the financial crisis seem to be passed. However, the industry is constantly fighting against uncertainties, overcapacities and low freight margins (Neise 2018, 27).

Logistics and freight transportation sector, which can be considered as one of the most traditional industry, has been facing the advent of industry 4.0 gradually. Different dimensional drivers, which are predicted to redefine logistics processes and develop door-to-door visibility in transport chains, have emerged (Reis & Macário 2019, 7). Wallgren (2018, 7) states that it is inevitable for the ocean freight industry to carefully investigate evolving global trends to be able to correspond to the changing trends and thus remain competitive.

Shippers are ever increasingly outsourcing their transport arrangement activities to freight forwarders, also called third-party logistics providers (3PL). Services provided by freight forwarders contain all activities related to the seamless and efficient flow of cargo from the point of origin to the destination (Subhashini & Preetha 2018, 276–277). Freight forwarding industry has been facing an increasing competition in Europe since 1990’s due to deregulation and liberalization. Consequently, competitors from Eastern European countries have appeared in the markets and have reached competitive positions in the Europe due to cheaper labour costs (Bock 2010, 733).

Customers are expecting and demanding ever more efficient and transparent service. Consequently, service providers need to integrate their operations to be capable to correspond to the increasing expectations. To implement this, companies are pushed to reshape their business and operational models so that they are capable to adapt to the changing business environment (Ernst & Young 2018). It has been found out that real-time data helps transport operators to react and plan proactively stages of the cargo movement, and concurrently provide added value to customers in terms of supply chain transparency. Therefore, real-time data will benefit different stakeholders, such as carriers, forwarders and shippers, in the transport chain. Data ecosystems which contain real-time information about containers, are already in the stage of implementation in ports of Hamburg, Antwerp and Singapore (McKinsey & Company 2017, 24). According to Harris, Wang and Wang (2015, 88), to establish competitive global and local supply chains of firms, integrated multimodal networks are vital.

When focusing on technological drivers in more detail, there are a few technological disruptions which are predicted to be the game changers of the whole freight transport industry (Reis & Macário 2019, 7). According to Hartley and Sawaya (2019, 707), it is expected that technological disruptions such as Robotics Process Automation (RPA), Artificial intelligence (AI) and blockchain technology will change business processes of supply chain operations. Reis and Macário (2019, 7–8) emphasize that it has been predicted that IoT (Internet of Things) will play a crucial role in technological transformation in the logistics and transport sector. As IoT is a network which contains different units such as containers, pallets, parcels and vehicles, it enables the interaction and interconnectivity of data between the units. Consequently, visibility of the whole transport chain will be improved. Blockchain technology in turn allows tracking and tracing reliable and secure data of shipments. Other technological trends include automatized drones, 5G systems and standard loading units. Leviäkangas (2016, 2) states that digitalization as a term is amalgamated to the concept of Intelligent Transport Systems (ITS), which means the adoption of modern information technologies to transport systems.

European Commission has also noticed the importance of technological advancements and the need of technology adoption to transport industry. The topic of digitalization in multimodal networks has been emphasized recently in governmental level and thus the year 2018 was nominated as “The Year of Multimodality”. The objective was to reach a fully integrated transport system through legislative and policy acts. The purposes for this technological reform were to keep European transportation safe and competitive in

the global context. There are several on-going projects to establish fully integrated multimodal networks in Europe and increase technological utilization throughout those networks. The reason why the emphasis of these governmental-level projects is especially on technological changes is that it is known that digitalization, big data and novel technologies contain a huge potential to significantly change the way how freight is moving currently in terms of managing and monitoring the flow of cargo. It has been found out that digital transport chains enable fluent communication between stakeholders in supply chains, make processes transparent which allows to manage cargo flows real-time, and a more optimal usage of resources and infrastructures. In a big picture, this is predicted to bring not only cost savings and efficiency, but also novel business opportunities, innovations and business models (European Commission, 2020).

Based on all the above-mentioned hype, it could be presumed that logistics and transport industry has adopted a lot of advanced technological enablers to increase transparency due to their massive benefits for all stakeholders in the transport chains. Press releases insinuate that digitalization is vital as companies which will not digitize, will sooner or later die. That is plausible, but given that freight transport industry is struggling with extremely low margins and technology is pronounced to be the one and only solution to stay competitive in the markets, what will happen to the majority of logistics service providers which tend to be small-sized? Can different sized companies afford investing in expensive technologies and what happens to those who cannot?

By working in operative department in the freight forwarding industry for years, the author perceived a prominent difference on the experienced practical reality and the current literature of transparency and visibility in transport chains. Especially in multimodal transport chains, where several different operators are involved, black holes of cargo movement tend to appear. Millar (2015, 25) states that it is obvious that plenty of firms assimilate the positive impacts and the significance of supply chain visibility, but a fractional number of companies have yet adopted visibility to their operations. Wallgren (2018, 7) indicate that findings of a smart shipping survey conducted in 2018 reveal that a major number of maritime directors believe that digitalization and big data will reshape the industry significantly. However, only 8,7 percent saw those technological changes in their current operations. Thus, it can be perceived that even though disruptive technologies are already invented, those are not yet broadly implemented in supply chains.

## 1.2 Purpose of the study and research questions

Several research gaps in the current academic literature were identified. It has been noticed that there is limited research on maritime transport chains (Talley 2013; Elbert, Pontow & Benlian 2017) and digitization of maritime transport chains (Fruth & Teuteberg 2017). Moreover, Harris et al. (2015) noticed that previous studies focusing on ICT adoption and the complexities of it in multimodal contexts are lacking. Even though technological advancements and their benefits are widely introduced, several authors (Ngai, Lai & Cheng 2008; Perego, Perotti & Mangiaracina 2011; Harris et al. 2015) have noticed that recent scientific studies focusing on the actual adoption of technologies among logistics service providers are lacking.

As already absorbed, it has been predicted that in-transit visibility of cargo is becoming a norm due to an attempt for more efficient and competitive global supply chains. The need to focus especially on multimodal transport chains is that freight transportation globally requires more than one mode of transport. Moreover, visibility is more challenging to adopt to multimodal transport chains compared to single-mode transports due to the gigantic number of different operators involved in the carriage of goods. As ocean freight transport is currently the most popular mode of transport and is predicted to even grow, there is a need to investigate visibility of cargo movement in multimodal maritime container transport chains more.

The main objective of this study is to investigate visibility in multimodal maritime container transport chains in the perspective of logistics service providers. To achieve this goal, the following research sub-questions are set:

1. How visibility appears currently in multimodal maritime container transport chains?
2. What are the benefits and opportunities that are emerging from visibility in multimodal maritime container transport chains?
3. What are the barriers that are hindering the adoption of visibility in multimodal maritime container transport chains?
4. What are the perceptions towards the importance of visibility as a service offering in the creation of competitive strategies?

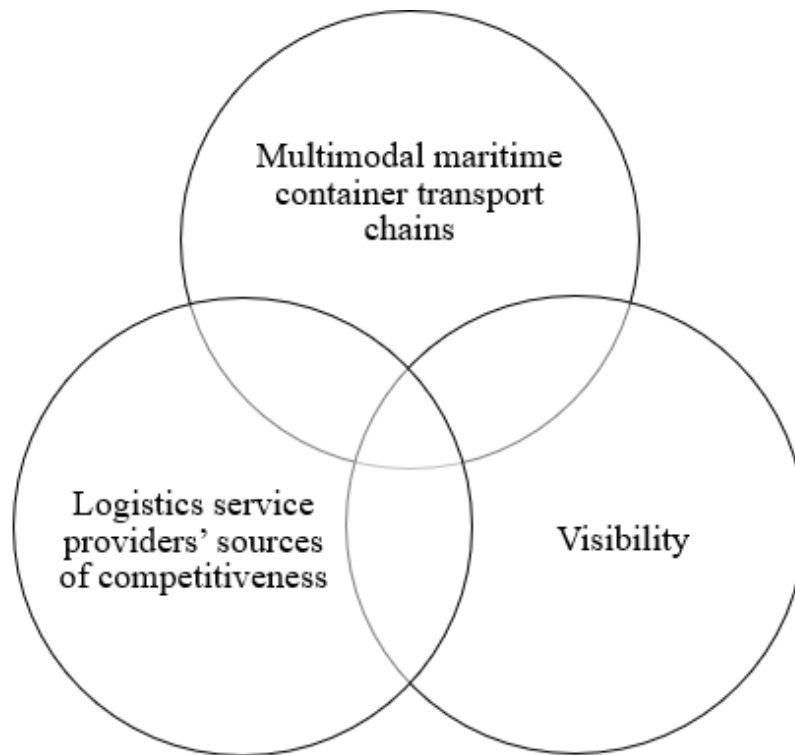


Figure 1. Illustration of the researched phenomena

Kaipia and Hartiala (2006, 377) define end-to-end supply chain visibility with a following sentence:

*“the sharing of all relevant information between supply chain partners, also over echelons in the chain.”*

The illustration of the researched phenomena is presented in figure 1. The scope of this study extends only to the door-to-door transportation of goods rather than the whole supply chain, which is a wider concept. Moreover, transparency and visibility are referred to digital milestone data transferred through electronic interfaces between IT-systems of different stakeholders aiming for automatized information exchange and better awareness of real-time position of the cargo. In this study, transparency and visibility are discussed interchangeably and without profound and multidimensional definitions for them.

The focus of this study is on micro and small-sized logistics service providers located in Finland. In order to have a degree of comparison for those companies, a medium-sized logistics service provider having a top position in the ocean freight forwarding segment, was included in the research. The research is conducted by interviewing total 5 freight forwarding companies, i.e. third-party logistics service providers, which are providing

multimodal maritime container transports as a service offering. The empirical material of this study is limited only to the perceptions of logistics service providers, which act as organizers of multimodal transport services. The interviewed companies are logistics service providers which are fulfilling parts of multimodal transport solutions both with own assets and as buyers of transport service by subcontracting through established global network of transport operators. As maritime container transports require using sea carriers and, in some cases, also subcontractors for road haulage part, these companies are designated as third-party logistics service providers and freight forwarders interchangeably in this study.

This report is organized as follows. Chapter 2 is divided into three sub-sections and contains theoretical background of the relevant concepts, theories and previous studies related to the researched phenomena. The research design chapter 3 will follow theoretical background and includes a detailed description of the methods utilized during the research process, data collection and analysis, and evaluation of the study. In chapter 4, empirical findings of the semi-structured interviews are presented. Chapter 5 includes conclusions of the findings and discussion of the research contributions. Chapter 6 encapsulates the study with a summary.



## 2 THEORETICAL BACKGROUND

### 2.1 Introduction to freight transportation industry

#### 2.1.1 Logistics service providers in freight transport markets

Nowadays, an increasing number of firms are buying a service of goods transportation from place a to b, and the decision about the mode of transport will remain to the nominated logistics service provider (Solakivi & Ojala 2017, 512). For that reason, Neise (2018, 63) states that freight forwarding business is expected to increase due to the motivation of customers to outsource their logistics management to better concentrate on other business activities. Freight transportation industry consists of logistics service providers which focus on the production of different types of services (see figure 2). Reis and Macário (2019, 18–19) explain that freight forwarders i.e. third-party logistics providers, are middlemen between transport sector and customers. Their duties include decision-making about modal choices for the shipments of their customers and choosing transport operators for moving cargo from place to another. Freight forwarders do not always have own assets but act more as brokers between shippers and carriers. During the carriage of goods, freight forwarders are responsible for monitoring and ensuring the seamless flow of consignments.

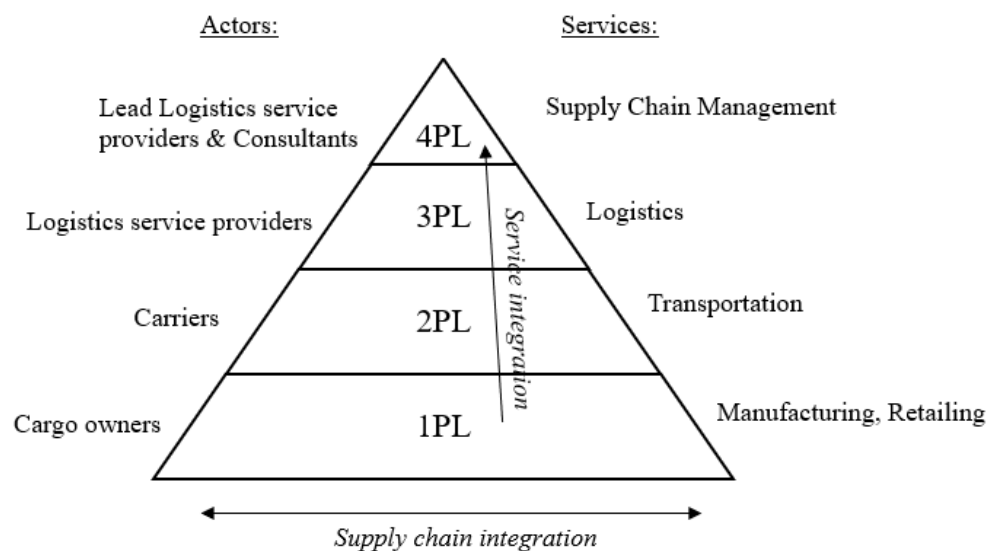


Figure 2. Layers of logistics service providers in the freight transportation industry.

Adapted from Transportation Consulting Services LLC.

According to Neise (2018, 63), it has been predicted that the demand for container shipping will continue to increase as companies which are exporting goods are seeking for cost-efficiency and high-performance. However, Reis and Macário (2019, 6) state that freight transportation is usually seen as an additional cost for firms and it is not perceived as a value-adding activity for the final product. As indicated by Krajewska and Kopfer (2006, 302), the margins of freight forwarders are based on the difference between the total amount of transport expenses charged from the customer and the total costs of executing the transport requests. Margins in freight forwarding are around 1-4 per cents, which can be considered as relatively low (Roland Berger 2013). The top five ocean freight forwarders based on the shipped TEUs in 2018 were Kuehne+Nagel (4,7 million TEUs), Sinotrans, DHL, DB Schenker and Panalpina (Statista 2020). According to Millar (2015, 164), the top 10 freight forwarders globally comprise 42% market share of the overall freight markets. The rest is shared between thousands of smaller rivals, which makes the industry fragmented.

When considering intermodal freight transport market, it contains a vast number of sub-markets. To demonstrate this better, let's imagine a container transport from the Netherlands to Italy, for instance. There are many different service providers involved in the transport chain of such route. For instance, service providers which have focused on pre-haulage, transshipment, main-haulage, and end-haulage for containers. Logistics service providers are integrating these different parts of the cargo journey by picking the most suitable players in the sub-markets to operate the specific part of the transport. Therefore, the players in those specific sub-markets are competing to achieve the service attributes demanded by logistics service providers (Saeedi, Wiegman, Behdani & Zuidwijk 2017b, 142).

According to Krajewska and Kopfer (2006, 301–302), freight forwarders fulfil transport services either by using own assets or through subcontracted carriers. Large freight forwarders conquer small and medium-sized freight forwarders due to their strong access to assets and rank in the market power structure in the global context. Therefore, smaller freight forwarders need to join their forces to extend their resources and strengthen their market positions. Bock (2010, 733) states that cooperation among freight forwarders relates to the acts of outsourcing different parts of the transport process and creation of transport hubs and networks.

### 2.1.2 Intermodal and multimodal freight transportation

The carriage of goods with more than one mode has been discussed with several different synonyms: Intermodal or combined transport are often used along with multimodal transportation. In these types of transports, the core mode of transport is usually ocean, whereas the collection and last-mile delivery are usually operated by trucks (Song & Panayides 2015, 109–111). To avoid vagueness, it is necessary to define both intermodal and multimodal transport, as those concepts will be discussed interchangeably in this report due to their subtle difference. One of the first definitions of multimodal transportation was endeavoured by the United Nations Convention on International Multimodal Transport of Goods, Article 1 (UNCTAD 1981, 5) with a following description:

*“International multimodal transport means the carriage of goods by at least two different modes of transport on the basis of a multimodal transport contract from a place in one country at which the goods are taken in charge by the multi modal transport operator to a place designated for delivery situated in a different country.”*

Definition for intermodal transportation has been proposed by European Commission by a following determination in 1997:

*“Intermodality is a characteristic of a transport system, that allows at least two different modes to be used in an integrated manner in a door-to door transport chain.”* (European Commission 1997, 1)

The roots of intermodal transportation start from the era of containerization, when sizes of containers became ISO-standardized and thus enabled to integrate both sea and road transportation modes of a journey (Song & Panayides 2015, 114). Containerization being a key enabler, the way of moving cargo from place to another has changed from a traditional unimodal to a multimodal carriage of goods, which allows the combination of all transport modes in an integrated and efficient manner. Also, globalization has been driving freight transport sector to change from unimodal to multimodal transport solutions (Harris et al. 2015, 89). Moreover, Wagener (2014, 371) states that poor road infrastructure and environmental downsides caused by road haulage are factors which have

been forcing to emphasize a replacement of road transportation with rail or sea modes and combining different modes.

According to Wagener (2014, 373), there are two dominating segments in intermodal markets. First, the seaborne trade which focuses on the sea carriage of goods between seaports. Containers are leased by sea carriers or shipping lines. Second market focuses on continental transportation, where containers are placed in swap bodies or crane-able semitrailers carried by road. These assets are usually owned by forwarders. Containers can also be placed in container railcars and carriage of goods is then operated by rail.

### 2.1.3 Maritime container transport chains

Containers are remarkably utilized in maritime shipping. The International Standard Organization (ISO) has designated standard sizes of maritime containers; the most common sizes of containers in the shipping industry are 40 foot (12,18 meters) and 20 foot 6,09 meters). The latter has been nominated as the standard benchmark measurement in the container industry and is called TEU (twenty-foot-equivalent-unit). Due to the standard sizes of containers, door-to-door transportation is possible through the usage of multiple transport modes (sea, rail, road) during the journey (Neise 2018, 17). Figure 3 shows the actors involved in the door-to-door carriage of containerized goods in a multimodal maritime transport chain.

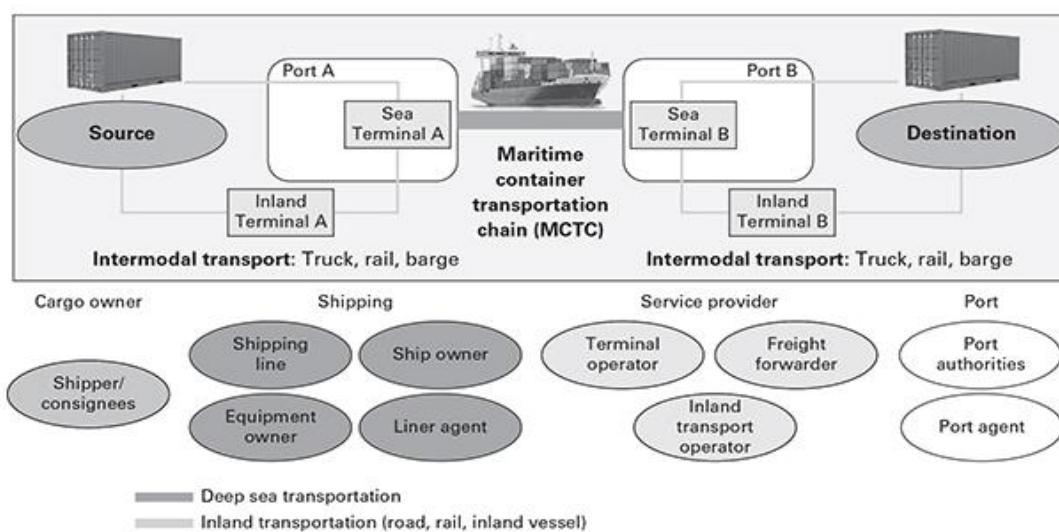


Figure 3. Actors in the maritime container transportation chain (Neise 2018, 32)

The maritime value chain is a modification based on Michael Porter's value chain (see figure 4). It shows the synergy of different actors such as freight forwarders, shipping lines and port operators, which are involved in carrying the primary activities related to maritime transportation. For instance, shippers are the customers of freight forwarders, and they again are the customers of shipping lines. Shipping lines in turn are the customers of port operators. Furthermore, the figure shows different secondary activities such as service offerings, which aim to support the primary activities (Song & Panayides 2015, 58–59).

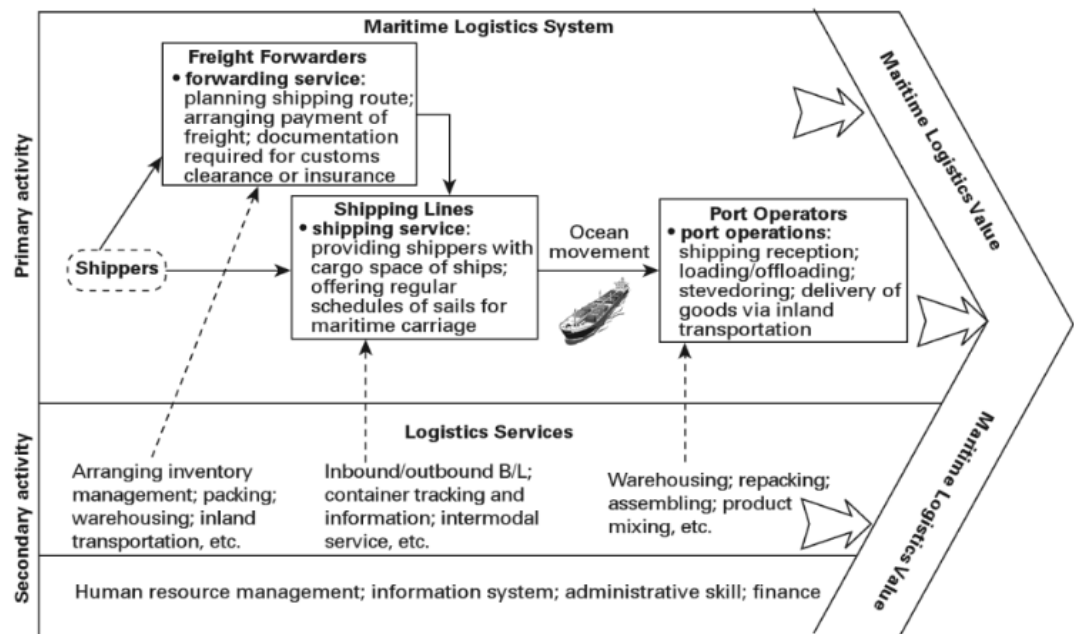


Figure 4. Maritime value chain (Song & Panayides 2015, 59)

Sometimes, freight forwarders and carriers compose cooperative acts because some routes have reluctant space which freight forwarders can fill by booking space for small customers to those routes (Lee, Tang, Yin & An 2015, 1119). The actions in the maritime container transport chains are usually monitored by a shipper, or a receiver or a third-party logistics provider such as ocean freight forwarder. When considering the role of freight forwarders in maritime container transport chain, they are the actors who manage the overall end-to-end activities throughout the chain (Neise 2018, 31–33).

#### 2.1.4 The logic of bargaining maritime container freight rates

The logic of ocean freight pricing is intricate. Typically, there are base rates which are quoted to the buyer of the freight. Sometimes those base rates already include some obligatory surcharges, but not always. In case not, surcharges will be added separately which in turn distort the presumptions of ocean freight rates based on base rates. Containers are quoted “price per box” method. The freight rates are quoted based on the size of the containers (20ft or 40ft) or containers with special facilities (i.e. reefers). However, freight rates may differ between customers even if the route would be the same. Therefore, the dynamics of pricing is impossible to generalize. There are some publications about periodical average ocean freight rates, but those are naturally excluding the discounts which are customer specific. Freight forwarders and carriers are usually renewing their freight rate contracts by holding informal negotiations every quarterly. This allows carriers to adapt charges based on market conditions. Container freight rates usually depend on the customer’s importance to the shipping line, considering shipped volume, for instance (Slack & Gouvello, 2011, 1482–1483). Shipping lines and their customers form both short-term and long-term contracts which conform the negotiated freight rates during the specific period (Yin, Wan, Kim & Zheng 2019, 174). The “leftovers” of the ocean vessel space are usually auctioned in spot markets. Spots are booked just few weeks before vessel departure and the prices are unknown to the buyer prior to ante. When having long-term negotiated contracts, ocean freight prices are fixed during that period whereas spot-prices might be cheaper (or more expensive) than the negotiated contracts (Lee et al. 2015, 1119).

#### 2.1.5 Information flow in multimodal container transport chains

When considering door-to-door transportation of global supply chains, the importance of hinterland transport is increasing. In case the importer has delegated transport arrangements to a freight forwarder, the first step is that the importer will contact the freight forwarder (3PL) to arrange hinterland transport for the container after receiving the shipping details from the shipper. Thus, logistics service provider will contact a trucker to book a hinterland transport for the container and receives a booking confirmation from the trucker. Next, forwarder will inform the importer that inland haulage is booked. Importer will send the import customs documents to the customs for customs clearance (or

to freight forwarder based on contracts). Shipping lines and terminal further negotiate the commercial release of a container. After rehearsal, trucker will agree the schedule for container pick-up with the terminal. The last step is that the terminal will response to the appointment request (Wiegmans, Menger, Behdani & van Arem 2018, 3–5). However, when considering the countries located in the Baltic Sea Region, all the export and import containers are additionally transhipped from an ocean vessel to a smaller container vessel, i.e. feeders, in big European hubs (Serry 2019, 15). This means that there is one more actor in the multimodal transport chain when comparing to transportations in the Middle-Europe, which can access ocean vessels directly. Wiegmans et al. (2018, 2) identified different challenges related to information exchange between different actors in multimodal transport chains. These are information blanks regarding relevant data of the current status of containers, for instance. This complicates the planning and monitoring the next steps of the cargo flow and may lead to errors in decision-making.

## **2.2 Visibility in multimodal transport chains**

### **2.2.1 Factors enhancing visibility**

Digitalization, considered as the most remarkable global technological trend, has also extended to transport sector (Leviäkangas 2016, 1). According to Song and Panayides (2015, 17), the stage of digitalization varies significantly. In some countries, information flow between different operators in transport chains is already fully digital, whereas information exchange in some other countries is still very primitive. Tongzon and Nguyen (2013, 566) state that ICT is a crucial source of competitiveness as it enables to correspond to the needs of customers in terms of supply chain integration and efficiency. Lin (2008, 24) categorized technological innovations into 4 groups in the area of logistics industry: data acquisition (bar code systems), information (EDI), warehousing (collection systems aided by computers) and transportation (GPS). However, Mathauer and Hofmann (2019, 419) state that the abovementioned technologies are antiquated given that technology has high integration capabilities nowadays.

Product visibility can be achieved through tracking and tracing the path of the unit by using different methods and technological enablers such as RFID, sensor networks, barcodes and communication channels. Container tracking, which enables the visibility

of cargo movement, is based on RFID tags attached to containers. The restriction regarding RFID tags is that it can provide data only when using an RFID reader, which are scarcely existing yet (Musa, Gunasekaran & Yusuf 2014, 176, 179). There are also other track and trace devices available in container shipping. Due to their technological advancements, data of distractions and the real-time position of cargo can be monitored. All this sensor data can be shared seamlessly to different players in the multimodal transport chains if interfaces between systems are established (Harris et al. 2015, 96).

However, Millar (2015, 39) emphasizes that technology alone does not create transparent supply chains. It requires also inter-organizational collaboration to build interfaces with different systems for data sharing in the supply chains. According to Neise (2018, 2), collaboration and relationships building are among key activities of successful firms in other industries. Neise (2018, 393) defines collaboration as “*the ability to work across organizational boundaries to build and manage value-added processes*”. It is usually about exchanging and sharing of data, people and technology. Collaboration can be divided into horizontal and vertical collaboration. Figure 5 illustrates the factors enhancing visibility in transport chains.

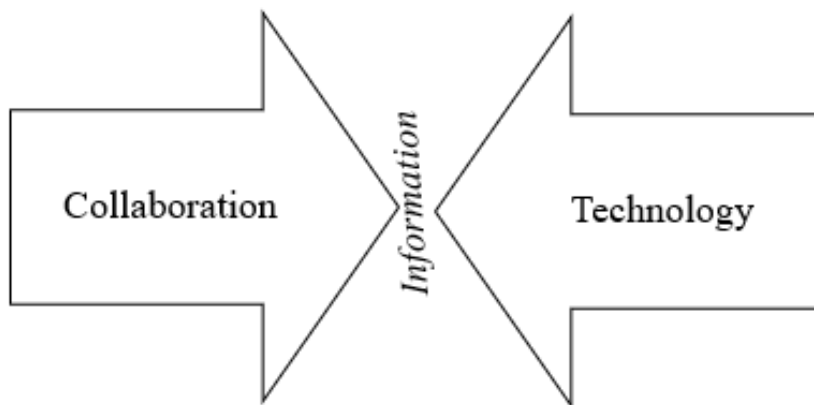


Figure 5. Factors that enhance visibility in transport chains

Increasing supply chain demands are forcing logistics service providers and consignors to focus on constructing robust relationships between each other, i.e. vertical cooperation aiming for mutual benefits. Horizontal cooperation means the collaboration with actors which are providing same service or product in the market, i.e. competitors. The aim of such collaboration is to gain competitive advantages of logistics service providers through improved logistics networks and increase efficiency in terms of capacity



utilization. Vertical collaboration is about cooperating with parties from different positions in the supply chain (Cruijssen, Cools & Dullaert 2007, 129–130). Horizontal and vertical cooperation with different supply chain actors are a form of strategic behavior (Carbone & Stone 2005, 499). These means of integration can be fulfilled in various levels of seriousness. For instance, subcontracting is a mild form of business integration by aiming for a short-term cooperation. In contrast, strategic alliances and joint ventures are examples of robust collaboration, let alone mergers and acquisitions which are ultimate forms of business integrations (Saeedi, Wiegman, Behdani & Zuidwijk 2017a, 14). Even though previous literature presents different forms of collaboration, scientific studies related to the adoption of such collaborative relationships among different parties in transport chains are lacking.

According to Carlan, Sys and Vanelander (2016, 51), creation of a collaborative innovation in the maritime industry requires strong collaboration between the stakeholders. Therefore, it is pivotal that stakeholders are committed to share information and are aware of each stakeholder's roles and processes in the supply chain. Innovations here are denoted as ICT developments of the business processes. Innovations related to port-activities are usually bringing positive cost benefits. However, those benefits are often not emerging instantly, and therefore stakeholders are not convinced to be the payers for the innovation.

Millar (2015, 27) states that IT plays a big role when developing visibility in supply chains. However, transparency of operations, motivation for data sharing and collaborative partnerships with other stakeholders in the chain are crucial when aiming for visible supply chains. According to Leviäkangas (2016, 1), Finland in front has been utilizing ICT and technological novelties, and there have been governmental-level projects to correspond to digital disruptions. When considering customer's aspect, digitalization should be extended door-to-door rather than single mode only. As already mentioned earlier, transport sector consists of different stakeholders such as customers, operators, units and vehicles of transport, infrastructures, authorities, administrators and system suppliers. All these players of the industry will face digitalization, but apparently not simultaneously. Car manufacturing industry is a good example of fast adoption in digitalization due to its digital capabilities and motivated attitude towards technology (Leviäkangas 2016, 10).

### 2.2.2 Benefits and opportunities of visibility

Technological trends contain many benefits when applied to the freight transport industry. For example, Reis and Macário (2019, 9) state that digitalization enables improved door-to-door visibility of transport chains. Consequently, it is easier to monitor transport chains and react to discrepancies. For that reason, persistence towards external distractions will stretch. According to Wang and Pettit (2016, 473), real-time visibility of cargo movement, seamless exchange of information, and possibility to prepare for unanticipated changes and proactively plan next steps of the transport are benefits enabled through ICT-adoption. According to McKinsey & Company (2017, 5), full supply chain transparency will benefit firms with specialized cold-chain shipments and industries like automotive, significantly. It is crucial for those industries to be able to forecast quantities, have reliable information regarding cargo movement and reduce inefficiencies. This is also an opportunity for service providers to differentiate in the market with a value-added service function. However, not all customers or industries require value-added services, but want a basic and cheap rate for the transportation of cargo.

Evangelista and Kilpala (2007) studied ICT adoption among SME-sized logistics service providers in Northern European countries and Italy. Based on the findings, they found out that the benefits of ICT adoption perceived by logistics service providers referred to improvement in customer service, more fluent planning and control of operations and improved exchange of information with other stakeholders in the supply chain (Evangelista & Kilpala 2007, 91). Evangelista, Mogre, Perego, Raspagliesi and Sweeney (2012) investigated the relationships between ICT-adoption and firm performance among small and medium-sized Italian 3PL providers. Findings revealed that there is a positive correlation between these two factors. It was found out that data-gathering technologies such as RFID, barcodes and EDI helped to improve many areas of operations and was a source of richer visibility in the supply chain operations. Also, EDI was saving time of employees in terms of redundancy to contact customers for information sharing and typing data manually into different systems (Evangelista et al. 2012, 181). Tongzon and Nguyen (2013) studied ICT adoption among logistics service providers in the ASEAN countries (more specifically Singapore, Malaysia, Vietnam, Cambodia and Indonesia). It was found out that the most meaningful benefits linked to ICT-adoption perceived by logistics service providers referred to the improvement of competitive advantage, customer value, service offering, cost reducing factors and supply chain integration

(Tongzon & Nguyen 2013, 566). According to Reis and Macário (2019, 35), the quality and costs of service provider can improve remarkably by adopting technology, such as cargo track & trace systems, to the transport chains. Usually, the only restrictions of technology adoption are linked to the service provider's motivation to adopt technology to the processes. On the other hand, Leviäkangas (2016, 7) states that the linkages between ICT-intensity and productivity in Finnish transport sector are barely visible, and therefore there are other means, other than digitalization and ICT, for firms to increase productivity.

### 2.2.3 The current stage of adopting visibility

Technological capabilities enabling visibility are still weak in a broad number of organizations (Millar 2015, 28). According to the survey conducted by Economist Intelligence Unit and KPMG in 2013, 49% of the global manufacturing firm directors admitted that their supply chains are not visible, whereas only 9% out of 335 firms of the sample found that their supply chains are completely visible (Millar 2015, 27–28). According to Harris et al. (2015, 88), information and communication technologies are poorly represented in European and UK-based multimodal transport networks.

Evangelista and Kilpala (2007) studied technological capabilities among small and medium-sized logistics service providers located in Northern European countries (Finland, Northern Norway and Northern Sweden) and in Italy. Based on the answers of 168 logistics service providers located in Nordics, all companies did not even use Internet and some of the companies did not even plan to switch to the era of internet in the future. It was also founded that the implementation rate of electronic data interchange (EDI) was the lowest in Finland and Sweden by being in child's shoes. Moreover, findings discovered that Norwegian logistics service providers were more developed in terms of technology, and 40% of the investigated logistics service providers had implemented EDI. Furthermore, 47% of 153 Italian logistics service providers had adopted EDI. However, the usage of GPS technology was more common among Finnish logistics service providers compared to any other surveyed countries. It was noticed that regardless the small size of the logistics service providers included in the study, many of them offered plenty of advanced services to gain customer satisfaction. Track and trace function as a value adding service offering was provided by 24,2 % of the investigated companies (Evangelista & Kilpala 2007, 89–95).

Marchet, Perego and Perotti (2009) investigated IT-adoption among Italian third-party logistics providers. The findings discovered that track and trace applications which are enabled by GPS and GPRS or mobile networks, were most often implemented. However, the level of integration between different applications was rather low. Only 24 out of total 75 companies had integration between two applications, whereas there were only 8 companies among those 75 companies who had IT-integration between 3 different applications. Furthermore, Marchet et al. (2009, 790) state that there is a big gap in terms of ICT-adoption between large, small and medium-sized logistics service providers. Large companies have invested massively to the IT-advancements, whereas small and medium-sized companies are still struggling with the resistance to change, along with financial and human resource issues. Thus, it was concluded that firm-size has a positive effect to the technology adoption of logistics service providers. Based on the findings of the study which investigated the level of ICT-implementation among small and medium-sized logistics service providers in Italy and Northern Europe (Evangelista & Kilpala 2007), it can be summarized that Northern European countries should take a big leap to be able to provide freight tracking. However, it was founded that these companies were not aiming at investing to ICT in the future. Lin (2008, 33) investigated determinants which affect to the technology implementation among Chinese logistics service providers. Findings revealed that capital size of Chinese logistics service providers may affect positively to the enthusiasm to adopt technology.

#### 2.2.4 Barriers to adopt visibility

The reason why information flow in the transport chain is vital is that when neglected, the flow of goods might halt (Reis & Macedo 2019, 758). According to Neise (2018, 78), the role of information and communication technology (ICT) in visibility is remarkable. Despite the remarkable benefits of multimodalism, Harris et al. (2015, 88) state that crucial incoherence in such transport solutions is the hardship of lacking integrated information flow between the numerous operators involved in the transport chain. Recently, several ICT-advancements to enable better information flow, have been presented. Neise (2018, 78) emphasizes that regardless the numerous benefits of technology in logistics and transportation, there are challenges and issues which are hindering the adoption of those tools in the industry. For instance, lack of standardization has caused incompatibility between systems and thus it challenging to share information. Harris et al. (2015, 100)

state that their study has been the first one which combines concept of multimodal transport operations, technological trends and hindrances of technology adoption. Figure 6 shows the composition of barriers related to ICT-adoption, which are categorized into user-related, policy-related and technology-related barriers.

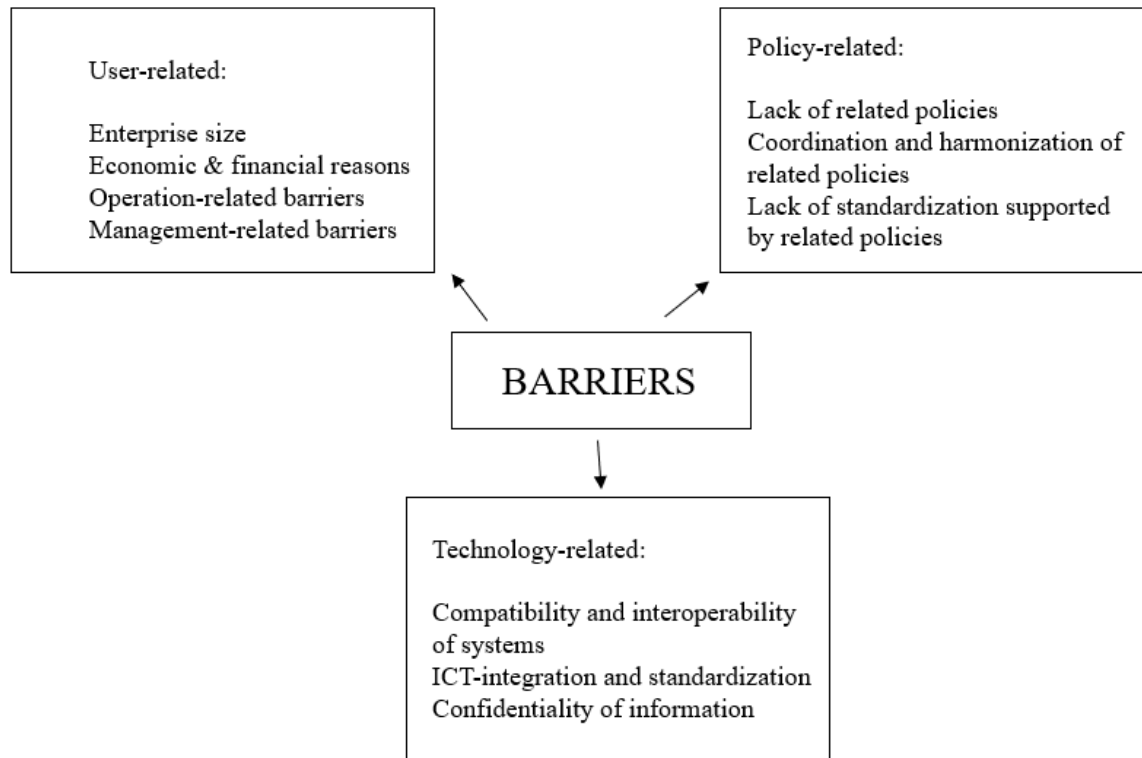


Figure 6. Barriers of technology adoption (based on KOMODA 2009, adapted from Harris et al. 2015, 93)

One of the biggest challenges in multimodal transport chains has been the lack of instantaneous access to the status information of a shipment due to a high number of operators in the transport chain (Harris et al. 2015, 96). Based on the results of an EU-wide project called PROMIT, which focused on technological transformation in intermodal transportation between 2006 and 2009, several barriers of the applicability of interoperable ICT in intermodal transportation were identified. Firstly, the incompatibility caused by the heterogeneity of IT-systems among numerous operators in multimodal transport chains complicates the ICT-adoption in intermodal transport chains. Secondly, lack of IT standards hinders the construction of compatible IT-systems between different actors in the transport chains. Additionally, it was noticed that the reason behind the issue of incompatibility is that there is a lack of motivation between stakeholders to collaborate

in terms of ICT integration in multimodal transport chains (VTT Technical Research Centre of Finland 2009, 84). Evangelista and Kilpala (2007, 95) discovered that Norwegian logistics service providers see incompatibility of the current IT systems and lack of EDI-standards between companies as barriers for ICT-adoption. The same survey disclosed that Italian logistics service providers perceived high investment rates and cost of implementing as the most remarkable factor hindering the ICT-adoption. Along with lack of IT training staff, lack of system standardization was seen problematic by Italian logistics service providers.

Marchet et al. (2009) found out that there are two clear reasons for low ICT-adoption among the investigated Italian logistics service providers. Firstly, firms are unable to identify the benefits which are lying in ICT and secondly, the industry is highly fragmented and consists of a high number of subcontractors. This scenario is not persuading for high investments in technological novelties (Marchet et al. 2009, 808). Evangelista and Kilpala (2007, 96) have also referred to the EU transport markets which are highly fragmented as the logistics companies operating in the area are majorly small-sized. Based on the findings of the study conducted by Mathauer and Hofmann (2019, 427), the main issues in technology adoption by logistics service providers are lack of skilled employees to handle new IT-systems. The same study disclosed that the lack of compatibility with other IT-systems was a trigger to discontinue IT-projects. According to the study conducted by Tongzon and Nguyen (2013, 557), logistics service providers in ASEAN countries perceived high costs of ICT-investments, financial issues, data security issues and unawareness of the advantages evolved by ICT-adaptation as the main barriers. Evangelista, McKinnon, and Sweeney (2013, 983) discovered that barriers of ICT-adoption among small and medium sized 3PL providers were linked to the high costs of investments, companies' lack of IT skills and understanding the advantages of ICT-utilization. Mathauer and Hofmann (2019, 424) found out that logistics service providers think that buying and adopting standardized systems is faster and more cost-effective. Evangelista and Sweeney (2006) discovered that doubtfulness towards return on investment of ICT applications is a hindering factor to the adoption of ICT enablers into multimodal transport.

## 2.3 Logistics service providers' strategies to create competitive advantage

According to Coulter, Darden, Coulter and Brown (1989, 51), logistics service providers have realized that to survive in the highly competitive freight markets, there is a need to identify customer demands, and therefore bundle different service attributes which will correspond to the demands of the coveted customer segments. Anderson, Coltman, Devinney and Keating (2011, 97–98) state that it is commonly challenging for logistics service providers to gain understanding of which service components customers value. Besides key offerings such as movement of cargo and warehousing, IT systems and customer service, 3PL's must be able to combine tailored valuable components to correspond to the needs of different customers. According to Solakivi and Ojala (2017), there is a high variation of attributes which impact to the selection of a transport service provider. Moreover, Andersson et al. (2011, 98) state that customers are having different determinants when choosing a 3PL provider, depending on their particular needs. Panayides (2004) investigated logistics service providers' strategies to compete in the markets, and discovered that service differentiation, market segmentation and inter-functional coordination are fostering high performance of logistics service providers. However, cost-leadership is perceived as a factor affecting positively to the performance of logistics service providers. The same study indicates that service differentiation can contribute to the creation of customer and organizational value. This is pivotal in a sense that it can make it easier for customers to realize the customer value of heterogeneous service attributes of different logistics service providers (Panayides 2004, 10–11).

### 2.3.1 Resource-based view theory

Different theories related to firm's strategic acts to achieve a competitive position from different perspectives exist. The most known theories are created by Michael Porter, by proposing two crucial strategies for firm's growth. They were related to the selection of most compatible industries based on the model of five competitive forces, or reaching a competitive position on markets by differentiating, by being cost leader or focused firm through value chain analysis (Olavarrieta & Ellinger 1997, 560). Resource-based view (RBV) theory is one of the most effective perspective in terms of competitive advantages of firms (Liu, McKinnon, Grant & Feng 2010, 24). According to Wong and Karia (2010, 52), resource-based theory can be used as a theoretical backbone to explain competitive

advantages of logistics service providers. It is a core of firm's strategic management to consider how they can achieve a competitive position in the markets. Resource is something which can be perceived either a strength or a weakness of an organization (Wernerfelt 1984, 172). Barney (1991, 99) nominates value, rareness, imitability and substitutability as the main sources of competitiveness.

Resource-based view is based on the assumptions that firms operating in the same industry can have heterogeneous strategic resources to achieve competitive position. Moreover, the strategic resources of firms are not easily duplicable by competitors and therefore the heterogeneity of firms will remain longer (Barney 1991, 101). According to Liu et al. (2010, 29), the core of the RBV-theory is that the competitive advantages evolved from the firms' resources and capabilities are such that they are difficult to replicate by rivals. It is easier for competitors to copy tangible assets compared to intangible assets. Das and Teng (2000, 32) explain that the sources of competitiveness evolve from internal resources and capabilities of firms. Resources in this context refer to physical, financial, individual and organizational features of a firm. The capability of a firm is related to the ability to harness the resources to achieve goals. Due to the firm-specific nature of resources, they are rarely homogenous and thus can be designated as a source of competitiveness for firms.

Wong and Karia (2010, 51) state that it is distinguishable that logistics service providers are using resources as the sources of competitive advantages. The acts taken to access resources are related to different levels of collaboration. Consequently, resources such as logistics networks and transport assets, track and trace software, and know-how and expertise of employees can be better accessed. Some logistics service providers are relying on robust variety of assets, whereas some logistics service providers avoid acquiring assets and focus more on expertise. Liu and Lyons (2011) investigated the linkages of service capabilities and performance of 3PL companies located in the UK and Taiwan. Based on the findings, operational performance and financial performance are strongly connected in both countries. However, the range of service offerings does not directly affect to the financial performance of a 3PL provider. Instead, through improved operational performance, 3PL companies who have service-offerings that gratify customers, will result in financial improvement (Liu & Lyons 2011, 565). Hartmann and De Grahl (2011) investigated the linkages between logistics service provider's flexibility and competitive advantage. Based on the survey findings, it was discovered that customer loyalty and the logistics service providers' flexibility have a high relationship and therefore it is



an important source of competitive advantage for logistics service providers. Based on the results, customers appreciate logistics service providers' positive attitude and motivation to tailor transport solutions that fit to the customer's needs (Hartmann & De Grahl 2011, 77–78).

Several studies indicate that logistics service providers are leaning on very heterogeneous resources to sustain competitiveness. For instance, Evangelista et al. (2013) conducted a study regarding ICT adoption of small and medium-sized third-party logistics providers. The study discovered that 3PL companies which have adopted customer-focused service innovations as their strategies were more typically leaning on ICT when implementing strategies. To maintain competitiveness, proactive ICT advances were used in the long-term strategic plans of firms, whereas many of less developed 3PL providers did not consider ICT as a significant factor for developing their competitive advantages. Furthermore, the study emphasized the importance of integration with supply chain partners and customers through IT-systems. The findings show that the companies which are focusing on value-added service offerings tend to utilize ICT and information integration more (Evangelista et al. 2013, 982–983).

Wong and Karia (2010) have also investigated logistics service providers' sources of competitiveness. Based on the results, all the 15 investigated logistics service providers were attempting to access strategic resources and to bundle them to reach competitive advantages which are hard to imitate. The resources were linked to physical, human, information, knowledge and relational resources. Physical resources were considered as one of the most crucial resources as network is a vital factor to reach different countries and networks are also difficult to imitate. Those companies which avoid acquiring assets, can join to alliances or partner with service providers to access physical resources. None of the logistics service providers owned all the physical resources which showed that it is pivotal to cooperate with other service providers to gain access to physical resources. Through information resources, all logistics service providers were pursuing the following matters: improved customer service capabilities through IT such as track and trace functions to monitor cargo flow and automatized document processing. However, building interconnections between different stakeholders was less common and only big companies such as UPS and DHL were able to adopt integrated IT systems with other stakeholders. Human and knowledge resources, i.e. know-how and experts were considered as a valuable resource among logistics service providers. An emphasis was also on the

knowledge of customer and therefore hired employees from different industries are considered as a valuable source of knowledge for logistics service providers (Wong & Karia 2010, 57–61). Besides focusing on resources, it is necessary for logistics service providers to determine their target markets, and then position themselves into those specific markets (Coulter et al. 1989, 57). Reis and Macário (2019, 33) state that some companies are focusing on different market segments according to their capabilities, whereas others have retained the traditional business model which was common before the deregulation of freight markets. The latter ones have been contented for poor market shares.

### 2.3.2 Service attributes valued by customers

Subhashini and Preetha (2018) investigated the service quality factors among Indian ocean freight forwarders. Based on the findings, Subhashini and Preetha (2018, 286) observed that factors such as reliability, responsibility, value and tangibility were linked to satisfaction of shippers. The same study suggests that to improve service quality, freight forwarders must be aware of the service attributes valued by customers and focus on improving those. Moreover, logistics service providers should be devoted and provide differentiated customer service to keep their customers satisfied. Based on the study conducted by Liu and Lyons (2011), the findings revealed that most important operational performance factors perceived by customers both in Taiwan and UK were on-time and accurate delivery, undamaged state delivery and higher customer satisfaction. Based on the same study, Taiwanese customers conceived track and trace service as the most important service capability. However, track and trace function were not as important for the customers located in the UK. In contrast to Taiwanese customers, UK-based customers found price negotiations more important than track and trace (Liu & Lyons 2011, 559–565).

The spectrum of customers in the freight transport markets is voluminous: there are both individuals who ship small volumes sporadically and big corporations with perpetual large volumes. This makes the understanding of freight transport markets extremely complex, as there is not a clear alignment of customer demands (Balci & Cetin 2017, 1101). Flodén, Barthel and Sorkina (2017) studied the factors affecting to the buyer's decision-making of a transport service in Europe by exploring previous scientific studies regarding the topic. The findings of previous studies disclose that cost has been overwhelmingly the most significant factor affecting to the buying behavior of a transport service. Other most important factors affecting to decision-making have been reliability, duration of the

transport, and transport quality. Even though it was noticed that the factors affecting to the decision-making have not been changing during the last 26 years, environmental aspects seem to stand out more currently but not compendiously (Flodén et al. 2017, 36). Flodén et al. (2017, 39) discovered that choice of a transport service is a two-step process. Quality of transport is first assessed. If it is sufficient, cost factor will be the following determinant. Figure 7 shows the important factors which are typically affecting to the buyer's decision-making of a transport service.

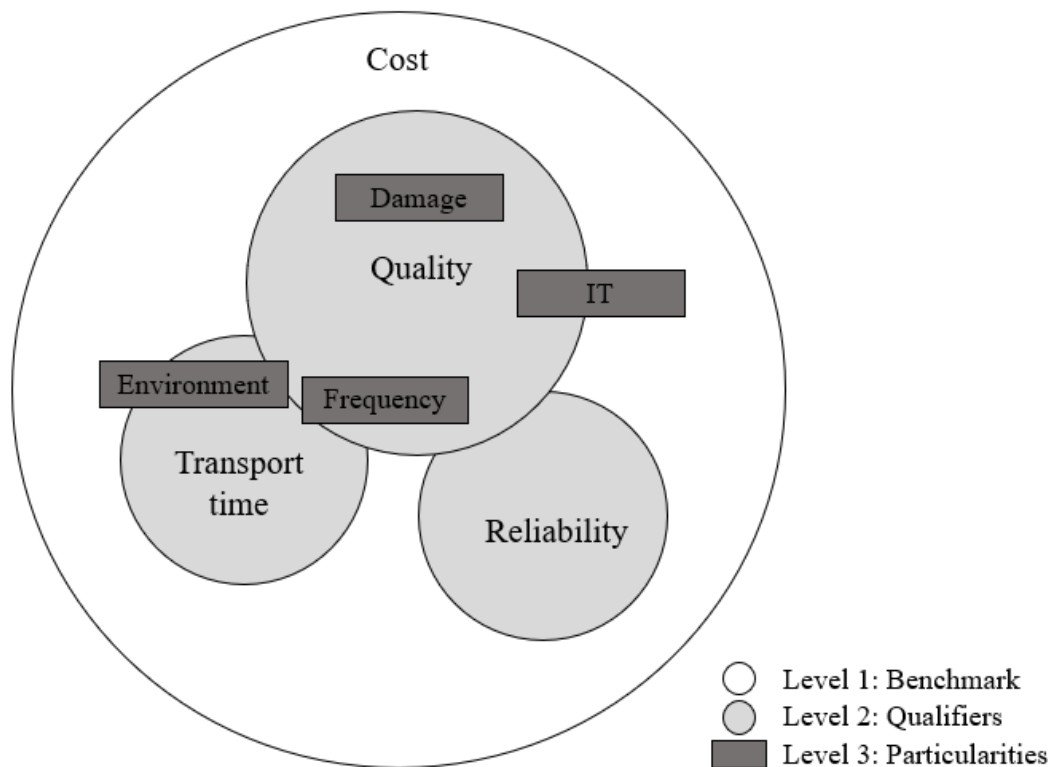


Figure 7. Important factors affecting to the decision-making of a transport service.

Adapted from Flodén et al. (2017, 40).

The superimposed echelons in the circle, namely benchmark, qualifiers and particularities, are in the order of importance when choosing a transport service provider. Freight cost being the most important factor, has been named as a benchmark. The changes in the overlapping echelons such as qualifiers (quality, reliability and transport time), will impact to the costs of the service. The particularities are having more negligible weight compared to other echelons but could be significant factors in individual level (Flodén et al. 2017, 39–40).

Market dynamics of freight transport industry are steering 3PL providers to position themselves on specific segments based on customer demands. Several third-party logistics market leaders include haulages with own assets in their service offerings. 3PLs form their service portfolios based on their strategic behavior to compete in the changing business markets (Carbone & Stone 2005, 499). As service demands differ significantly depending on customer segments, competitiveness can be achieved by distinct service levels of specific customer segments (Gilmour, Borg, Duffy, Johnston, Limbek & Shaw 1976, 141). To reach different customer segments in a global scale, successful firms create service strategies to customize their service offerings based on the demands of the target customer segments (Mentzer, Myers & Cheung 2004, 19). For instance, the rapid rise of shipped TEUs organized by Kuehne+Nagel has been a fruitful consequence of the company's strategic focus on the customers of pharmaceuticals and health care segments requiring temperature-controlled transportations (Waters 2017).

### 3 RESEARCH DESIGN

#### 3.1 Research approach

This research is conducted as a qualitative study due to its attributes applicable in qualitative research. According to Eriksson and Kovalainen (2016, 4–5), it is tricky to give a definition to qualitative research and thus it is easier to verbalize the differing factors of qualitative and quantitative research approaches. Quantitative approach focuses on structured and standardized collection of empirical data, aiming for explaining phenomena, test hypotheses and create statistics. In contrast, qualitative research focuses on the interpretation and understanding of the investigated phenomena rather than finding explanations and hypotheses. Ghauri, Grønhaug and Strange (2020, 21) explain that it is typical for qualitative approaches that the researcher is willing to find answers for the phenomena which logic is not understood. Questions such as “why?” and “Why does this happen?” may evolve. The purpose is to gain understanding and explanation for the phenomena. This in turn requires a deeper understanding of organizations’ way of doing and thus, qualitative research approach seemed to fit best to this study, which majorly consists of understanding a researched phenomenon. Eriksson and Kovalainen (2016, 4) state that research question(s) are the triggers to choose the most appropriate research method to conduct a research. As the research objective and sub-questions of this study required a deeper understanding of the researched phenomena, qualitative research was perceived as the most appropriate approach to conduct this study.

According to Eriksson and Kovalainen (2016, 22–24), basic research logics to bring knowledge forward in research are induction and deduction. Deduction leans on the existing theory and therefore aims for testing the hypothesis evolved from the existing knowledge of the topic in the empirical research. In contrary, inductive logic refers to the process where research begins from the collection of empirical data without glancing existing theories and concepts. This procedure refers to the logic that theories evolve from empirical data. However, the case is that typically neither deduction nor induction are used alone. The third research logic, abduction, means a constant bouncing between the utterance of humans and already existing theories and concepts to gain understanding of the researched phenomena. Therefore, some books introduce abduction as a mixture of deduction and induction. According to a Philosopher Charles Sanders Pierce, abduction

can be interpreted as a logic of exploratory data analysis. The core achievements of abduction in the research process is to generate new ideas and hypotheses. Tavory and Timmermans (2014, 5) state that abductive analysis differs from deduction and induction in the sense that abduction generates new theories based on the empirical findings. The core logic of induction is based on the aim to amplify existing theories by collecting new data of the researched phenomena, whereas deduction is based on a pre-determined hypothesis based on the observations of existing theories. Based on these interpretations, this study has been characterized by an abductive logic during the research process. As there were masses of scientific studies related to the benefits of technology in logistics and transportation, but a lack of novel studies which have studied the adoption of those technologies among logistics service providers in the context of multimodal maritime container transport chains, there were barely any theories existing.

### **3.2 Data collection**

According to Gray (2020, 192), there are several different kinds of qualitative research methods to collect data. In qualitative research, interviews can be used as the only data collection method or combine additional methods such as observations and document analyses. The types of qualitative interviews consist of semi-structured interviews, standardized interviews with structured script, or conversational interviews. As semi-structured interview allows asking probing questions (Gray 2020, 192), it was chosen as a data collection method for this study, due to the need to have a deeper knowledge and understanding of the researched phenomena. The empirical material of this study consists of statements given by 5 different logistics service providers located in Finland. The body of the semi-structured interviews is exposed in Appendix 1. The semi-structured interviews focused majorly on the significance of visibility in multimodal maritime container transport chains. However, as it came clear in the beginning that traditional exchange of information still applies broadly, additional probing questions regarding firms' competitive advantage in the freight markets, were necessary.

It is typical for qualitative interviews that they are conducted face-to-face, but telephone interviews and interviews by utilizing online tools are common, too. Even though qualitative interviews are typically arranged between the researcher and one participant, group interviews are also possible (Eriksson & Kovalainen 2016, 84). Accordingly, the

semi-structured interviews of this study included four face-to-face and one Teams-interview. The duration of each interview was approximately 40-45 minutes and the empirical material emerged through a dyadic interaction between the researcher and the informant. There were 4 main theme questions and the rest of the questions were supportive and probing. Each interview was tape-recorded and composed into textual form. Table 1 shows details of the case companies of this study. Furthermore, the positions of the informants in the case companies are revealed.

Table 1. Details of the case companies and informants

<b>Company / Informant</b>	<b>Multi-national</b>	<b>National</b>	<b>Turnover 2018 (€)</b>	<b>Size based on the number of employees (2018)</b>	<b>Position in the company</b>
A		X	5 000 000 - 6 000 000	Micro	CEO
B	X		500 000 - 1 000 000	Micro	Operations Director
C	X		80 000 000 - 90 000 000	Small	Overseas Director
D	X		6 000 000 - 7 000 0000	Small	Country Manager
E	X		150 000 000 - 160 000 000	Medium	Sea freight Manager

To consider the ethical aspect of the research process and to ensure the privacy of the interviewees, the organizations included in this study remained anonymous. The anonymity was emphasized when asking the access to interviews. Each interviewee was told repeatedly before and after the interview session that the name of the company and informant will be kept anonymous. This procedure helped in gaining more nuanced interview material and more demonstrative statements. The selection of different-sized firms which have different positions in the freight markets enabled to contrast the results and make observations to the opposite strategies to differentiate in the markets. Table 2 presents the operationalization table of this study.

Table 2. Operationalization table

Research objective	The research sub-questions	Themes in interviews
To investigate visibility in multimodal maritime container transport chains in the perspective of logistics service providers	How visibility appears currently in multimodal maritime container transport chains?	Multimodal maritime container transport chains and involved stakeholders
		Technological advancements (EDI, track and trace portals) and enablers of IT compatibility (collaboration)
		Information flow between stakeholders
	What are the benefits and opportunities that are emerging from visibility in multimodal maritime container transport chains?	Customer value
		Source of competitive advantage
		Efficiency
		Predictability
	What are the barriers that are hindering the adoption of visibility in multimodal maritime container transport chains?	Lack of IT-integration and compatibility
		Fragmented freight markets, inflexibility
		High costs of investments
		Capabilities
	What are the perceptions towards the importance of visibility as a service offering in the creation of competitive strategies?	Resource-based view theory
		Service attributes valued by customers
		Differentiation
		Customer segments

Secondary data was collected by searching for relevant literature and previous scientific studies related to the themes discussed during the interviews. The author endeavoured to select novel scientific articles in answering the research questions of this study. However, due to the scarcity of fresh academic articles disclosing previous empirical evidence related to the research questions, there was a need to include older studies, too. All



the scientific articles and books were evaluated critically before using them in this study, and majority of them are peer-reviewed.

### **3.3 Selection of interviewees**

Five case companies were included in this research to gain favourable amount of empirical material to answer the research questions. The selection of case companies started by scrolling information from the websites of each potential case company to familiarize more with their service offerings and other details. Different sized firms were selected intentionally in order to ensure that the empirical findings will reveal divergent viewpoints. However, there were some prerequisites, too. As the focus of this study is on multimodal maritime container transport chains, the author ascertained firstly that each selected company has such transport solution as their service offering. Another requirement was that each company has an office in Finland. This requirement was set to avoid disparity affected by governmental or cultural policies, for instance. The chosen interviewees were all representatives of companies which provide logistics services in Finland and abroad. Among the selected companies, 4 out of 5 were multinational and one was domestic. The companies differed by size and turnover, for instance. All the selected interviewees were in core positions in the companies, i.e. they held managerial positions.

If classifying the case companies based on the number of employees classified by European Union, there were two micro-sized firms (less than 10 employees), two small-sized firms (from 10 to 49 employees) and one medium-sized firm (50 to 249 employees) among the selected companies. In terms of size, all the case companies can be grouped into SME-enterprises (from 1 to 249 employees). However, even though firms cannot be directly generalized in those domains because their turnovers exceed some boundaries in specific categories, they will be discussed within those scales later in this report.

### **3.4 Data analysis**

According to Eriksson and Kovalainen (2016, 5), it is essential to analyse empirical data in qualitative research. Ghauri et al. (2020, 132) state that by analysing empirical material, the researcher filters the essential material by taking different actions to manipulate data. These actions help the researcher to test hypotheses, specify problems and form a better understanding of the researched phenomena. Eriksson and Kovalainen (2016, 119–121)

indicate that qualitative content analysis is about elaborating the collected data in terms of what is said and why it is said. Categorization and interpretation are two common types of qualitative content analyses. Categorization is based on the data treatment through a systematic coding of the material. The aspiration of categorization is to give a comprehensive factual description of the researched phenomena. Interpretation in turn emphasizes the efficient interpretation which endeavours for deeper understanding of the meaning of the issues behind the researched phenomenon. Interpretation may contain coding of the material, but it is not imperative.

After conducting the semi-structured interviews of this study, the author transcribed the tape-records which produced approximately 30 pages of transcribed text. Thereafter, the author carefully analysed the textual material by sorting the most relevant material of each interview chronologically according to themes. Since the interviews were conducted in a semi-structured manner, there was a need to separate pertinent data out of the whole mass of data which contained also less relevant material considering the purposes of this study. Furthermore, the author investigated additional details regarding each case company. Information such as turnover, geographical dispersion and number of employees helped the author to gain more understanding of the results and thus draw conclusions by finding causalities. After conducting the data analysis and the final version of the data transcription to be included in the report, the author contacted each informant with a request for approval.

### **3.5 Evaluation of the study**

The evaluation of this study is based on the judgement criteria presented by Guba and Lincoln (1982), which allege that the trustworthiness of a qualitative research can be evaluated through the following dimensions: credibility, transferability, dependability and confirmability (Guba 1981, 80).

*Credibility*, i.e. internal validity refers to the aspect whether the empirical findings and data interpretation are truthfully perceived by the sources of empirical data. A pragmatic step for the researcher is to ask, “Do the informants of the study agree that the statements given by them are credible?” Suggested by Guba (1981, 84), credibility of a research can be increased by engaging closely with the sources of the empirical data for a longer, through a persistent observation, triangulation of data and peer debriefs, for instance. Due to a limited time period to conduct this research, the researcher was unable

to engage with the data sources persistently. However, to increase credibility, the researcher had already familiarized with freight forwarding industry in grass-roots level by working several years in the industry. Therefore, the main concepts were already familiar to the researcher. Also, all the interviews were tape-recorded and transcribed, and the findings-part consists of the material from recorded interviews which are transcribed carefully. Thus, the veracity of statements given by the informants can be considered as advanced. Also, all the interviewed persons were keen to participate in this research, which was also perceptible during the interviews. The motivation to contribute to the research appeared also in the way that none of the interviewees hesitated to be interviewed. Also, all the interviewed persons were very focused during the interviews by giving demonstrative and spontaneous statements during the interviews. Also, the expertise of the informants can be expected of high quality due to their positions in the companies. These can be interpreted as factors which increase credibility of this study. Also, the process description of data collection has been as transparent as possible, however, in the boundaries of a confidentiality aspect. Also, the credibility of this study is also increased through triangulation of data, which is fostered by leaning on the collection of secondary data to support the interview findings.

*Transferability*, i.e. external validity, measures the applicability of empirical findings to other contexts. Therefore, Lincoln and Guba suggest that the selected sample should be representative in terms of their generalizability which enables to transfer the selected sample to other contexts (Guba 1981, 86). Even if there are debates concerning the transferability of qualitative researches to other contexts due to a small sample size, an adequate level of transferability is not utopian (Gioia, Corley & Hamilton 2012, 24).

*Dependability* refers to the scenario where the same study with the same interview questions and same informants could be replicated by a different investigator due to the transparency of the holistic description of a research process. Thus, the results of the study would still be somewhat the same (Guba & Lincoln 1982, 247). Guba and Lincoln (1982, 248) suggest that dependability of a research can be enhanced through overlapping methods, stepwise replication, and auditing. The scope of this research extends to the usage of overlapping methods such as semi-structured interviews, observations and secondary data. Also, the steps of the research process are described as detailly as possible. However, in this study, 4 out of 5 interviewees were not given details regarding the interviews in advance and therefore the interviewees did not have the possibility to prepare for the semi-structured interview questions. Thus, the answers of the interviewees repeatedly

could slightly differ from the original results as the interviewees might have ruminated the themes of the interviews afterwards. On the other hand, it is expectable that the one interviewee who had time to prepare for the answers, would answer more identically compared to those who did not have details of the interview beforehand. However, dependability of this research has been developed by a detailed description of research approach, data collection methods and the body of semi-structured interviews. However, there is a lack of profound description concerning the involved companies due to the confidentiality aspects of the research.

*Confirmability* refers to an unbiased role of a researcher to collect, handle and interpret data. Consequently, the empirical results are presented as objective findings of a researcher. To enhance confirmability, Guba and Lincoln (1982, 248) suggests data triangulation, reflexivity and audits. Transcription of the recorded interviews can be considered as a factor which has increased the confirmability of this study.

Besides trustworthiness, it is relevant to evaluate the data which has enabled the construction of theoretical framework. As already mentioned, majority of secondary data utilized in this study consists of peer reviewed academic and professional journals, academic books and news articles which are found by using the University's electronic library database and Google Scholars. Some Internet sources, such as Ernst & Young, McKinsey & Company and European Commission are also used which are considered as professional and reliable. Due to the lack of fresh academic literature of the topic, there was a need to include also older articles. However, the sources of secondary data have been evaluated critically and therefore, it can be pointed out that the utilization of mainly peer-reviewed articles taken from reliable databases increases the plausibility of the theoretical section of this study. Also, when possible, novel articles have been included.

## 4 FINDINGS

The data of this chapter consists of collected and analyzed data from five selected logistics service provider companies providing multimodal maritime container transport solutions. The primary findings of the material are presented in the subchapters 4.1 – 4.5. The structure of this chapter is following: the results are presented chronologically based on the themes covered in the interviews. The synthesis of the findings is presented at the end of this chapter.

### 4.1 Current adoption of visibility in transport chains

This sub-chapter presents the findings related to the first research sub-question, “*How visibility appears currently in multimodal maritime container transport chains?*”. The purpose of this sub-chapter is to gain understanding on how the transparency is currently appearing in terms of IT-integration and collaboration with the other operators in multimodal maritime container transport chains.

Informant A from company A states that information flow between involved stakeholders in the multimodal transport chains works mainly via emails. However, depending on the mode of transport, it is possible to check the position of the container shipment by typing freight document number in the shipping line’s portal. Company A itself does not have any track and trace portal where shipments could be followed. According to informant A, employees need to type information to several different IT-systems. For example, when looking back 15 years ago, freight forwarders had own systems and all data which was provided for customs, shipping lines, road haulage firms and so on, was emerged from the single system. In contrast, informant A annotates that now in the era of digitalization, the company A must type identical information to each stakeholder’s own IT-systems and therefore the same work must be done several times. Informant B from the company B states that it is possible to check the status of a container by typing the container number in the shipping line’s portal. Digital timestamps created by shipping lines enable visibility related to port locations, and actual time of departure and arrival of each container. According to informant B, their company is also planning to have an own system interface where the status of the container can be checked by using company’s own web browser. In road haulage, trailers are equipped with GPS devices which enables to

follow trailer locations. However, information between stakeholders is mainly shared via emails and phone calls. Company B does not have a cargo tracking portal for customers. Informant C from the company C elucidates that container movement is followed from the shipping line's track and trace portal and additionally, possible delay notices are received via emails. As opposed to company A and B, company C has a cargo tracking portal where shipments can be traced by customers. Informant D in turn elaborates that company D has established interfaces into their freight forwarding IT-system between different transport operators, such as shipping lines and airlines. Therefore, relevant data, which is produced by shipping lines, is received through electronic data interchange (EDI) messages. For example, proof of delivery messages (POD) are received when cargo is delivered to the consignee. Also, an EDI message will be received when an empty container is collected from the container depot. Like the company C, the company D has also a cargo tracking portal in their website where containers can be traced by customers. As the company D is multinational, the interfaces have been built in the company's main office and are available in all the countries where the company's offices are located. Local interfaces are tried to be avoided, but sometimes they are compulsive due to local distribution companies. According to informant D, approximately 80% of the EDI-messages sent by shipping companies are automatized. Informant D adds that due to the geographic location of Finland, the interfaces extend only to the big European ports. As the Baltic Sea region cannot be accessed by big ocean vessels, the import containers must be transhipped from an ocean vessel to a smaller feeder vessel in ports of Hamburg, Rotterdam or Bremerhaven, for instance. Therefore, it is uncertain how feeder lines pose electronic timestamps. As informant D states:

*“We must also consider that Finland is accessed by feeder lines. Big ocean vessels cannot enter Finland. Thus, when importing a container, the reliable data will break off in Bremerhaven or Hamburg. It is unsure how a feeder line generates a timestamp of the container arrival to port of Helsinki or Rauma.” – Informant D*

According to informant E, the company E has created partnerships with the biggest shipping lines and therefore, EDI-connections with those shipping lines have been established. Due to the EDI-connections with shipping lines, company E has been able to create a cargo tracking portal where customers can follow real-time milestone-information of

container shipments. Tracking portal shows also routing, estimated and actual transactions (i.e. timestamps). Informant E elaborates that road haulage in multimodal container transport is also visible in the track and trace portal, concerning the haulages which are administered by the company E. Moreover, Informant E clarifies that visibility extends to feeder lines, too. If the feeder is owned by the shipping company, company E will receive feeder-related data automatically through the shipping line's EDI-connection. If a commercial feeder is used, the feeder line is forwarding information to the shipping line, which is again forwarding the information to the company E through EDI-connection. The export bookings to the shipping lines are done via EDI-connections. The company E receives a confirmation via EDI-connection including shipping schedule, and information when an empty container is ready for pick-up from the container depot. Also, information about when the stuffed container must be delivered to the port, is included in the e-message. All the relevant information between port operators and shipping lines is forwarded to the company E through the shipping line's EDI-message. There are EDI-connections between port operators and shipping lines, and shipping lines and the company E.

## 4.2 Benefits and opportunities of visibility

This question was set to answer to the second research sub-question: *“What are the benefits and opportunities that are emerging from visibility in multimodal maritime container transport chains?”* This question aims for understanding the benefits and opportunities linked to the visibility of maritime container transport chains.

According to informant A, customers seldomly track status of cargoes for fun, as the working life is so hectic nowadays. Therefore, informant A do not see benefits in transparency and adds that when a customer asks the status of a cargo, problem is usually existing and then remedial actions must be taken. Informant B ponders that in case of express delivery or spare parts, it is quite essential to know the status of the shipment. On the other hand, informant B points out that circumstances are sometimes changing during the journey. For example, informant B recalls a recent occasion caused by a snowstorm in Spain, consequently resulting in an essential change for the planned schedule. Therefore, the driver of the road haulage part was the most appropriate informant to estimate the realistic duration of the journey. Informant B explains that is not very helpful if a GPS

device attached to the container is showing the location if traffic is crawling 10-20 kilometres per hour. However, informant B admits that in road haulage, GPS will confirm the exact location of the trailer, but the driver of the prime mover is the most accurate informant when estimating the changing schedule.

*“It does not help if there is a GPS showing the location if traffic is crawling 10-20 per hour. GPS will give a confirmation of the trailer location, but the driver of the prime mover is the most capable actor to estimate.” – Informant B*

Informant C brings the thought of modernity as a benefit and opportunity of transparency and adds that customers demand real-time information of shipment status to be able to inform their customers forward. Therefore, informant C thinks that it is obligatory in a sense to have some sort of transparency in transport chains. The view of the informant D is that visibility enables companies to operate in a way that the head office is located in Finland, the production is in far-East and markets could exist in the USA or middle-Europe, for instance. Therefore, the Finnish main office will have a better transparency and control over the whole transport chain and its expenses. And oftentimes, the customers of those companies are also big and global companies which will be imposed high penalties in case of delayed goods. The preparation and modifying supply chain functions will improve, if it will be noticed that some specific transport mode from Taiwan to England does not function well, for instance. Therefore, transparency enables to react to such things. According to informant D, interfaces between shipping lines also enable to monitor demurrage fees and thus makes it possible to inform the customer if a consignee has not collected the container from the dry port area. Consequently, informant D perceives visibility as an added value to the customer and states that it is a competitive advantage for Finnish companies that regardless the remote geographic location, their logistics is functioning well. If the customer of a Finnish company in Chile, for instance, feels that shipping from Finland to Chile is easy, Finnish companies will not fall behind German companies, for example.

*“I think that it is a competitive advantage for Finnish companies due to our remote geographic location, how well logistics is functioning to them. If their customer is located in Chile and feels that shipping from Finland to Chile is easy, we (Finnish companies) will not stay back compared to German companies, for instance.” – Informant D*



According to informant E, reliability of deliveries will improve distinctly in case visibility is adopted properly. Visibility enables to react to discrepancies proactively, which makes it possible to create different kinds of customer-specific solutions. According to informant E, transparency ensures also availability in the sense that if customers know that they have given some delivery promises to their customers, they can execute those better with the company E. Moreover, informant E elaborates that the companies which have a vital need to receive shipping data to plan own transports will benefit from transparency. For example, in importing, it is very important that those companies can estimate the moment when the shipments are available in their own warehouses or stores. If a company runs a machine shop project abroad, it is important to receive the shipment there in time to proceed with the project, for instance. Those customers need data very much and they are leaning on these tools significantly nowadays. In contrast to a bigger company, visibility might not play as important role for a smaller company which can trace the shipment manually. Nevertheless, informant E corrects that this scenario cannot be generalized. Many times, there are also small companies which want to ensure that the flow of transport is running efficiently and within the schedule which is promised to their customers. According to informant E, it is challenging in transport chains that data would be easily accessible. Therefore, digitalization and transparency bring opportunities in this challenge.

*“Data should be available easily and rapidly, and this is a common challenge of transport chains. Digitalization brings opportunities to develop even more cogent and reliable transport chains.” – Informant E*

### **4.3 Barriers to adopt visibility**

This question was set to answer to the third research sub-question: *“What are the barriers that are hindering the adoption of visibility in multimodal maritime container transport chains?”* This question aims for understanding the issues and challenges behind the adoption of visibility in multimodal maritime container transport chains.

Informant A finds that IT-integration with other operators is problematic because engaging with specific operators would lead to the inability to choose among the range of operators in the future. According to informant A, the way to overcome this barrier

would be to choose specific partners and integrate IT-systems with those. But then again, informant A notices that such procedure would force to collaborate only with the specific selected operators.

*“You could choose specific partners and integrate IT systems with them. But the problem is that then you are profiled only with those stakeholders and then you do not have other options.” – Informant A*

Informant B states that high expenses are a natural factor which is hindering the adoption of advanced IT-systems to increase visibility in transport chains. Also, due to the huge number of subcontractors which form the network abroad and therefore enable global operations, each operator is having own IT-systems which are incompatible with other systems. This is supported by Marchet et al. (2009) who state that the fragmentation of freight markets with a high number of subcontractors does not persuade for high investments and integrations between different players.

*“The freight markets have exploded. The market share is so small: for instance, when considering Schenker, which is one of the market leaders, it covers less than 15% of the overall European markets.” ... “The operating profit in freight transport sector is around 3-4 %. It is quite a low profit margin.” – Informant B*

Informant B says that when considering the variety of the subcontractors, there is also very diverse types of data processing. For instance, some domestic prime mover operators have barely any IT-systems where haulage orders could be entered. Some subcontractors in the Eastern countries might have very primitive calendars with pen marks regarding collections on the calendar. Some have traditional price lists which include prices of haulages and those are invoiced based on the lists. These statements support the findings of the study conducted by Evangelista and Kilpala (2007). According to informant B, IT-integration is quite a long journey for small operators. Instead, big operators are leading the discussion by bringing own ERP systems to customers. Those require IT-integration between systems, which might be beneficial, too. However, informant B emphasizes that transportation industry is operating with low margins and thus it is problematic in terms of big IT-investments, as the investments should gain positive returns. As

founded by Evangelista and Sweeney (2006), the doubts of firms related to return on investment of ICT applications hinder the adoption of IT in multimodal transport chains.

*“Transport industry is operating with low margins, and you need to depreciate the value of investments. If you cannot do that, why to invest?” – Informant B*

Informant B underlines that each operator is attempting to find exclusive partners as the freight transport industry is all about networking. One must choose the most eligible operator from the candidates to collaborate with. Additionally, informant B opines that the challenge is that systems are surprisingly expensive and investing to those and forcing collaborators to integrate to the same system is hard to justify. After pondering the probable solution to overcome the above-mentioned barriers, informant B points out that there should be less ERP-systems. Informant B believes that even the market leaders in the freight industry are using subcontractors in some regions where they do not have own assets. And those subcontractors cannot be forced to integrate to IT-systems of those big companies.

*“It is challenging in transport industry that DHL is for sure good in the area of Germany, Benelux countries, big domestic markets and Scandinavia, but I am pretty sure that they are not that efficient in Bulgaria and Romania. Therefore, they are also using subcontractors instead of using own assets there and therefore the subcontractor would need to integrate to the system, too. However, you cannot force anyone to integrate IT-systems.” – Informant B*

According to informant C, Finnish customers are still desiring personal service in Finland. For instance, when doing business, Finnish customers are still preferring face-to-face interactions. Another viewpoint expressed by informant C is that the number of stakeholders is much lower in a unimodal road transport, because everything is arranged and operated mainly with the company’s own assets. In multimodal ocean transport, there are a high number of operators, subcontractors and stakeholders which are not having compatible systems. Thus, it is challenging to integrate IT-systems because there is a high number of subcontractors which are selected based on the lowest prices.

*“When contrasting to road haulage, it is so much easier due to the remarkably lower number of stakeholders. In our company, we are operating road haulages with own assets, but there are inevitably so many other operators, subcontractors and stakeholders in multimodal maritime container transports and as the IT systems are not compatible, it makes things so much more challenging.” – Informant C*

Informant D excogitates that one factor which impedes the adoption of visibility is that IT projects are very expensive. Another factor is that doing changes in systems is a long-term plan which cannot be implemented again biennially. Moreover, IT-projects are sometimes obstructed by lack of workforce from IT-sector. Informant D considers also that in global firms, changes in a specific country might mess a broader system. In addition, lack of standards in IT-systems is also problematic.

*“When considering the number of subcontractors, it is challenging to integrate because prices are commanding which subcontractor to use. For example, in ocean freight, prices are changing monthly, so we are forced to monitor monthly which operator to use in the following month.” – Informant C*

Informant E points out that when considering specifically Finland, feeder-connections have been challenging. Feeder-schedules are changing very often and the route of a feeder moving in the Baltic Sea may change suddenly. Moreover, capacities might change. There are also distractions in the operations of ocean vessels, such as blank sailing and seasonality changes caused by Chinese New Year, for instance. Supply and demand are fluctuating largely and consequently, shipping lines are aiming at cost-efficiency by limiting supply to ensure that ships are not operating empty. All the changing information is affecting to the big picture.

#### **4.4 Visibility in the creation of competitive strategies**

The questions in this chapter were set to answer to the fourth research sub-question: *“What are the perceptions towards the importance of visibility as a service offering in the creation of competitive strategies?”* This question aims for understanding the service demands of customers, sources of competitiveness and the perceptions of logistics service providers towards the importance of visibility in the creation of strategies to compete.

#### 4.4.1 Sources of competitiveness and service demands of customers

Company A indicates that expertise and service are absolutely the triumph of their company and emphasizes that service is a differentiating factor in their customer segment. Furthermore, informant A annotates that the company A is having one contact person to serve the customer, whereas many competitors are operating in a way that one contact person will coordinate only one part of the ocean transport. That does not happen in company A's operations. Informant B identifies that flexibility, service and rapid responsiveness are the competitive advantages of the company B and admits that pricewise they will most likely never be the number one. Therefore, they are competing with several other factors. Informant B also emphasizes the robust coverage of subcontractors within the whole Europe and the versatile service offerings in a big scale, from own railway wagons to own trailers and warehouse operations. Therefore, the variety of service offerings is abundant.

*“I believe that bigger firms want to have own systems and to engage customers into the system. Then again, the smaller companies like us want to compete with service and flexibility, to solve challenges of customers differently” ... “There is kind of a broader bundle which we are offering” – Informant B*

According to informant C, locality and domesticity are the competitive advantages of the company C. Informant C contrasts this by referring to the competitors which are German and Danish, for instance. However, informant C reminds that their company's track and trace functions can be considered as competing factors, too.

*“We are a local transport company and we are like a family owned business. We are not like our competitors which are German, Danish and so on. We are totally Finnish.” – Informant C*

Informant D discloses an interesting contradiction: even if traceability seems to be a crucial factor in the bidding stage, customers are desiring personal service from the company D during the carriage of goods, and preferably in a way that one contact person knows everything from the order until the final billing of the transport. It has also been noticed by informant D that customers prefer to send an email or call to find out the status

of the shipment. According to informant D, it is very crucial how rapidly the status information will reach the customer, thus giving a perception to the customer that everything is under control. Informant D sums that the size of their company is appropriate in the sense that it is capable to communicate personally with the customers but also having the back office to provide quality reports.

*“Many times, customers demand track and trace portal and other tools in the stage of bidding, but customers seldomly use those. It seems to be easier for them to send an email or call to us to find out the status of the shipment.” – Informant D*

According to informant E, the competitive advantages of the company E consists of the IT advancements and the benefits it brings to customers. Moreover, the global network, which is operating consistently worldwide, is a thing which can provide added value. It is also stated by informant E that customer-centric policy is in their company’s core strategy.

*“We are surely in the system-side, if not the most developed, at least one of the most developed operators” ... “Customer is in the core in our policy, so we are considering things with customer’s point-of-view very much” – Informant E*

When it comes to the company E’s track and trace portal, informant E elaborates that nowadays customers are highly relying on this proactive service offering. By using it, customers do not need to ask the status of each container all the time. Of course, in case of a discrepancy, the company E reacts to it and consequently there will be a joint discussion with the customer about possible procedures. However, informant E highlights that the company E is principally relying on the track and trace tool and customers are also trusting that reliable data can be got out of the tool. According to informant E, their company has received a lot of positive feedback about the tracking service from the customers.

According to informant E, the company’s procurement is well-developed. Company E is creating long-term collaboration with the shipping lines and in practice, they are already cooperating with all the most important shipping lines. Due to the company E’s high volumes, the company must ensure that their customers have allocation in the carrier, and the company E has containers available for customers. These are the themes that

company E is periodically discussing with the shipping lines. Of course, prices are also discussed but the company E has a variety of different contracts depending on the shipping lines. Different ways to develop collaboration with the operators is practiced.

*“We are endeavoring long-term collaboration to be capable to develop the big picture to ensure that customers would gain the best possible advantage out of it.” – Informant E*

Informant E reminds, that naturally there are the so-called spot-bookings which the company E is handling separately, but the big volumes stipulate the company to have a wider contract which it is leaning on to be able to plan different shipping volumes of customers. For example, if a customer has hundreds of TEUs in ten different ports, company E needs to plan according to an up-front forecast given by the customer. Therefore, company E is planning how much the customer needs allocation in each port in specific periods.

#### 4.4.2 The perceived importance of visibility as a service offering

Informant A does not see the point of tracing and visibility, and do not think that it is significant to know the location of the shipment. Informant A refers to the 30 years career in the freight forwarding industry. Things have not changed even if tracing systems have become more familiar. Informant B admits that door-to-door visibility is surely a crucial factor in some cases. On the other hand, based on the informant B's personal experiences of arranging special temperature transports from Finland to Belgium and Spain, containers included GPS-tracking, but tracking was not a crucial factor in the selection of a transport service provider. Thus, tracking did not bring any added value to the customer as those shipments were never traced. However, informant B adds that perhaps the temperatures of containers could have been monitored but nothing else as carriers are operating according to their own schedules and customers have their own delivery frequencies.

*“I would say that if the system works well intrinsically, it does not require any added value” ... “I do not refuse the fact that there are advantages in door-to-door transparency, but for now it would require having less competitors.” – Informant B*

Informant C opines that door-to-door visibility is surely an important factor in decision-making of a logistics service provider. Especially, when a customer selects logistics service providers based on what they can provide electronically, how they can track and trace the shipments, it is surely quite an important factor. Informant D in turn emphasizes that door-to-door transparency is a crucial factor in the selection of a logistics service provider and adds that there have been researches about it: in e-commerce, for instance, customer's positive perception about buying experience and delivery is crucial.

*"It is usually required that before you can enter the stage of bidding, customers want to have a guarantee that you are able to deliver the shipment." – Informant D*

Informant D also points out that transparency is a vital factor in specific customer segments, such as fashion industry. Without transparency, informant D believes that the company D would not be doing business with that segment. Based on the statements of informant E, it is very important nowadays that collaborators can provide services which increase transparency. Furthermore, it is important that the company E can provide data for customers in a global scale due to the advanced worldwide transport networks.

*"Transparency enables us the access to specific customer segments. Otherwise we would helplessly diverge from fashion logistics, which is very fast-paced and consists of all possible modes of transport (ocean, air, ocean-air, rail). Without transparency, we are not a plausible player in the markets." – Informant D*

Informant A remarks that after all, delays and real problems occur very seldomly. However, investing in digital technologies depend on how big the cost of investment is. Informant B opines that investing in digital technologies depend on the customer's needs. If the customer feels that tracking will benefit, then it is axiomatic. 24 tons bulk of feed to Estonia which takes 24 hours is given as an example by informant B to illustrate the redundancy of transparency in such transport.

*"It depends on where you ship, what you ship, those factors will compose the entirety. I am not sceptic but the stage when the benefit will evolve, must be considered." ... "In my opinion, added value will exist usually when the schedule is an essential factor of decision. In that case, we are talking about air freight." – Informant B*



Informant C reacts to the question by nodding and highlights the importance of visibility. Informant D nods likewise and says that the importance of investing in digital technologies can be seen in the number of ongoing IT-projects in the company D.

*“We are having around 23-27 different IT-projects currently, so it (investments in technology) has been highlighted constantly. – Informant D*

According to informant E, visibility is a must-have thing nowadays. The systems are developed by considering customer in terms of easiness in receiving price, transport schedule and book freight seamlessly. Companies are also building EDI-connections between the company E and there are already many customers which have built EDI-connections with the company E. Thus, information which is received through EDI-connection by company E, can be forwarded to the customer through EDI-connection. Moreover, customers can send a booking to the company E through EDI, and the company E can forward the booking to shipping lines through EDI.

*“Even if digitalization would work out excellently, brains and expertise are still needed to figure out how a transportation will be carried out really as it requires a human being.” – Informant A*

#### **4.5 Synthesis of the findings**

Based on the findings, there is a relationship between size of the logistics service provider and IT-advancements. For instance, the two micro-sized logistics service providers are not leaning on visibility as a service offering at all, but are more emphasizing other resources such as expertise, flexibility, personalized customer service and responsiveness. The two small-sized logistics service providers are providing track and trace portal as a service offering but are also focusing on personalized customer service. An incoherent revelation regarding customer behaviour was also revealed by small-sized logistics service providers: customers demand track and trace service in the stage of bidding, but during the carriage of goods, customers prefer to find out the status of the container by contacting logistics service providers through emails or phone. Furthermore, customers demand customer service where all information is provided by one contact person, even though track and trace portal would be available.

The medium-sized logistics service provider, which is also among the top players in ocean freight forwarding, has a very advanced level of visibility followed by a strong collaboration and EDI-integration with players (i.e. biggest shipping lines) in the container transport chain. Track and trace portal were considered as an indispensable value-added service by the market leader by justification that reliability of delivery will improve distinctly in case visibility is adopted appropriately in the company's processes. Several previous studies (Flodén et al. 2017) and (Subhashini & Preetha 2018) have mentioned reliability as one of the most important service attributes affecting to the customer satisfaction and selection of a logistics service provider. This could lead to assumptions that customers assume that reliability of delivery will be improved through IT-enabled transparency. However, the findings of this study show that micro-sized logistics service providers do not consider visibility of transport chains as important compared to the perceptions of small and medium-sized logistics service providers. The micro-sized logistics service providers rely on personal human communication when finding out status of the cargo. Even though the two small-sized logistics service providers have adopted track and trace portals, they have noticed that their customers still prefer traditional communication to find out status of the cargo and they are not willing to know the status of their shipments unless there is a problem.

Based on the findings, a significant issue of a deep horizontal and vertical collaboration emerged: two micro-sized and one small-sized logistics service providers found integration and deep collaboration with other operators and stakeholders impossible, as they are using so many different subcontractors in the carriage of goods depending on the country, for instance. Also, these logistics service providers elaborated that they are selecting operators mainly based on the lowest freight rates and thus are aiming more for short-term collaboration when subcontracting. For instance, carriers are selected based on cheapest container-prices on a monthly-basis which preclude long-term collaboration. An interesting finding was the reversed strategy of the market leader. The market leader was specifically aiming for long-term collaboration with shipping lines to ensure availability of containers and possibility to create service improvements through EDI-connections. Based on this, the market leader had established long-term deep collaborations with the biggest shipping lines. Findings also show that the attitude towards the importance of visibility as a service offering and the adoption of ICT and deep collaboration to enhance visibility seems to be exponential to firm size. The micro-sized firms did not consider visibility as important, whereas small-sized companies perceived it important. The market

leader considered it as indispensable. Based on the statements given by micro-sized logistics service providers, other than IT advancements as a source of competitiveness transpired. As for the micro-sized companies which are not currently adopting IT to increase visibility, they are competing with personal service, know-how, responsiveness and rapid reflection. The informants of the small-sized logistics service providers mentioned both track and trace portals and the ability to give personalised service as their source for competitiveness. On the other hand, the market leader considered that their company's competitive advantage is more in the IT-system side, but also in the strong global network and customer-centric policy. Figure 8 shows logistics service providers' perceptions towards visibility and sources of competitiveness in this study. Circles contain informants' perceptions of the competitive advantages of their corresponding firms.

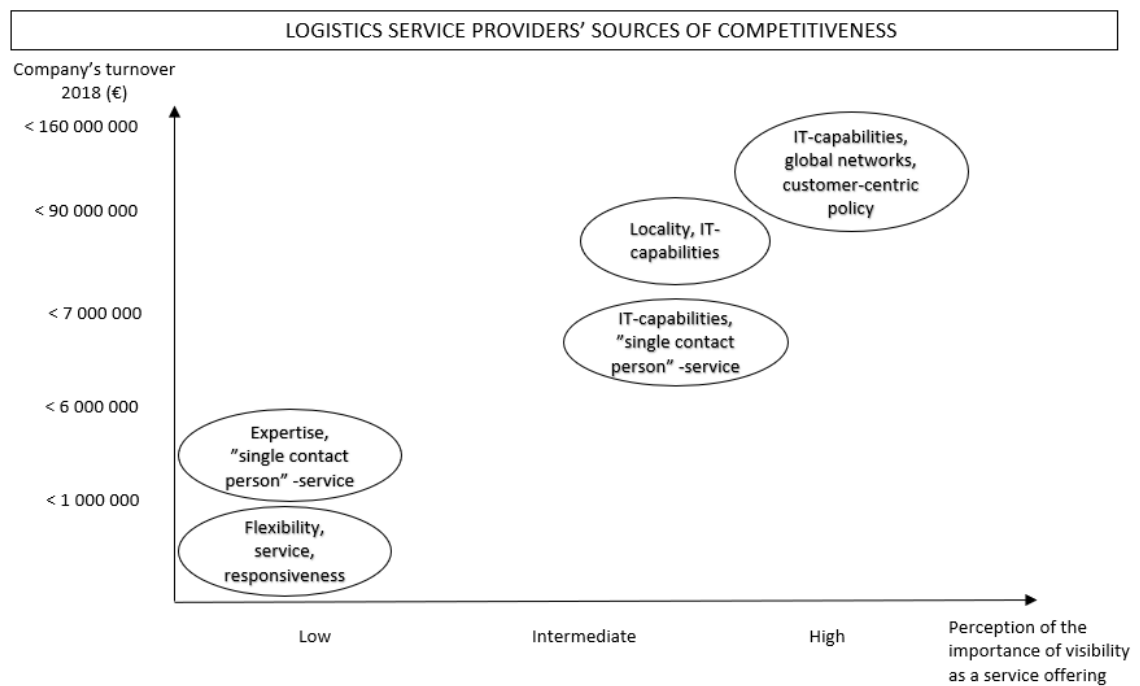


Figure 8. An illustration of the main findings

The findings reveal that the micro-sized logistics service providers with the lowest turnovers give lower importance towards visibility as a service offering. In contrast, small-sized logistics service providers with higher turnover perceive IT-capabilities as a source of competitiveness, but are also relying on other resources than IT. The medium-sized logistics service provider with distinctly highest turnover perceives a very high importance of visibility as a service offering and determines IT-capabilities together with global networks and customer-centric policy as sources of competitiveness.

## 5 CONCLUSIONS

The purpose of this study was to investigate visibility in multimodal maritime container transport chains in the perspective of logistics service providers. The following sub-chapter 5.1 contains theoretical contributions by unifying the empirical findings of this study and theoretical background. The chapter 5.2 discussed the managerial significance of this research. The chapter 5.3 discloses the limitations of this study and the chapter 5.4 proposes suggestions for future studies.

### 5.1 Theoretical contributions

There was a scarcity of up-to-date scientific articles related to the adoption of ICT technologies among logistics service providers. Therefore, rather old studies were included in this study. It was observed that a massive number of academic studies which cover the potentiality of technological advancements (such as digitalization, artificial intelligence, blockchain) to change the industry and enable fully transparent supply chains, are existing. However, the interviewed companies gave a very realistic review on the current stage of ICT adoption in terms of visibility. Based on the findings of this study, it can be concluded that fully transparent multimodal maritime container transport chains are challenging to implement. When comparing the adoption of visibility between micro-sized logistics service providers and the market leader, the difference is palpable.

According to Millar (2015, 28), technological capabilities enabling visibility are still weak in a broad number of organizations. The same is noticed by Harris et al. (2015, 88), who state that information and communication technologies are scantily represented in European and UK-based multimodal transport networks. This study arises similar perceptions. This study discovered that companies which have a higher number of employees and turnover had more advanced stage of ICT-adoption. Thus, the findings of this study reveal that there is an exponential growth of visibility-enabled ICT-adoption in terms of firm size. It was found that micro-sized firms did not adapt ICT to enable visibility. Small-sized logistics service providers had some level of visibility, and the medium-sized market leader had a very advanced ICT-adoption by having established IT-compatibility through EDI-connections for data sharing with shipping lines. The micro-sized logistics service providers' perceptions of IT-enabled visibility were rather sceptic. These findings

support the earlier findings by Marchet et al. (2009), who found out that firm-size has a positive effect to the technology adoption of logistics service providers. Based on the findings by Marchet et al. (2009), large firms have broadly invested in ICT, whereas smaller firms are struggling with financial and human resource issues together with resistant attitude. Based on the findings of this study, it seems that firm size has a positive effect on the level of IT advancement and positive attitude towards the importance of visibility. It can be concluded that the top players of the third-party logistics service providers are the vanguards for technological developments whereas smaller players in the markets are less daringly adopting ICT.

The present study discovered that the market leader emphasizes a customer-centric approach as a core of their company's strategy and thus perceives visibility as a vital value-adding service offering. Similar findings have been indicated earlier by Evangelista et al. (2013), who discovered that 3PL companies which have adopted customer-focused service innovations as their strategies were more commonly adopting ICT in strategies. The same study discovered that many less developed 3PL providers did not see ICT as an important source of competitiveness. Additionally, it was stated that companies which are focusing on value-added service offerings tend to utilize ICT and integrate systems with other stakeholders (Evangelista et al. 2013, 982–983). The findings of this study support the findings discovered by Evangelista et al. (2013).

This study found out that visibility has several benefits. For instance, ICT-adoption enables to exchange information seamlessly, optimizes planning of the next steps of cargo movement proactively, and helps to prepare for unanticipated changes. Similar findings were discovered previously by Wang and Pettit (2016, 473). In this study, it was emphasized that customers with specific needs will benefit from transparency. As stated by McKinsey & Company (2017, 5), transparency will benefit customers with specific needs such as automotive and refrigerated shipments, as it is crucial for those industries to be able to forecast quantities, have reliable information regarding cargo movement and reduce inefficiencies. The findings of this study support the statement as it was highlighted that customers with specific needs will give a higher importance towards visibility as a service offering. However, it was broadly agreed in the present study that visibility does not bring added value for all customers. The same was noticed by McKinsey & Company (2017, 5), which reminded that not all customers or industries demand value-added services but want the basic and cheap rate for the transportation of cargo. Additionally, the

findings of this study disclose that improved customer service, better control and responsiveness of the transport chain, ability to react to possible discrepancies and fluent flow of information are perceived as benefits of visibility. These findings support several previous studies. For instance, Evangelista and Kilpala (2007, 91) discovered that benefits of ICT adoption perceived by logistics service providers referred to improvement in customer service, more fluent planning and control of operations, and improved exchange of information with other stakeholders in the supply chain. Furthermore, the findings discovered by Tongzon and Nguyen (2013, 566) reveal that increased competitive advantage, customer value, service offering, cost reducing factors and supply chain integration are benefits of visibility. Evangelista et al. (2012) also highlight that EDI is saving time of employees in terms of redundancy to contact customers for information sharing and typing data manually into different systems (Evangelista et al. 2012, 181).

The findings of this study reveal that barriers of ICT-adoption are related to high costs of investment and incompatible IT-systems with other operators. Similar findings have been discovered earlier by Evangelista and Kilpala (2007), who found out that Norwegian logistics service providers see incompatibility of the current IT systems and lack of EDI-standards between companies as barriers for ICT-adoption. The same survey disclosed that Italian logistics service providers perceived high investment rates and cost of implementing as the most remarkable factor hindering the ICT-adoption. Marchet et al. (2009), state that lacking awareness of benefits evolved from ICT and the characteristics of freight transport industry are hindering ICT adoption among Italian small-sized logistics service providers. The same was also discovered in this study as the micro-sized logistics service providers did not recognize the benefits of visibility.

As one of the informants in this study pointed out, lack of IT experts to carry out projects is also a barrier which is hindering the adoption of ICT. The same view has also been disclosed by Mathauer and Hofmann (2019), who highlight that lack of skilled employees to execute IT projects is a hindering factor of ICT adoption. Additionally, the complexity of freight markets was discussed broadly in this study. The fragmented and highly competitive nature of freight transportation industry caused by the vast number of subcontractors was considered as unfavorable in terms of ICT-adoption at least by micro-sized and one small-sized logistics service providers. This finding is supported by previous studies by Marchet et al. (2009) and Evangelista and Kilpala (2007) who indicate that freight markets are fragmented due to a countless number of small-sized subcontractors which is not seen as a matching equation for high IT-investments. For that reason, it was

noticed in this study that the companies which had not adopted ICT to enhance visibility, were not willing to establish deep collaboration with different operators in the transport chains. This was rationalized with the reason that such procedure would have caused inflexibility to select different subcontractors in the future.

As explicated in the report covering the results of the EU-project PROMIT, one reason behind the issue of IT incompatibility is that there is a lack of motivation between stakeholders to collaborate in terms of ICT integration in multimodal transport chains (VTT Technical Research Center of Finland 2009, 84). The statement supports the findings of this study. Additionally, this study discovered that deep collaboration with subcontractors was not seen as an option as the level of IT-capabilities with micro-sized subcontractors is very primitive. The big variety of ICT adoption among logistics service providers has also been emphasized previously by Evangelista and Kilpala (2007). However, the results of this study reveal a completely opposite strategic actions in multimodal transport operations between market leader of the industry and the smaller freight forwarders. The market leader aimed at a strong and deep collaboration with shipping lines by building interfaces to connect EDI-messages. The motivation for this was that due to the large volumes of customers, there must be strong collaboration to ensure the availability of containers. Therefore, contracts and prices were agreed for the financial year. The approach of smaller freight forwarders was different; they emphasized the difficulty to form a deep collaboration between different shipping lines due to volatile freight prices. As the margins in the freight transport industry are low, micro and small-sized logistics service providers elaborated the inability to engage with specific partners in the transport chain. Freight rates of containers are majorly defining which carrier will be chosen by smaller logistics service providers. Therefore, it does not make sense for transport service providers to invest in expensive ICT-systems for integration, because it would mean higher freight rates which might be hazardous when considering sales. Also, the approach was justified with the viewpoint that some subcontractors are more efficient in different continents or parts of the continent compared to other operators, so in that sense it would be vulnerable to stick with the specific operators. For example, some very small subcontractors in the Eastern Bloc are very professional in operational level but are having very primitive ICT processes. However, the findings of this study reveal that it is vital for the market leader to form deep collaboration with shipping lines for instance, because the

shipped TEU volumes are so massive that the market leader must safeguard the availability for containers. Therefore, deep collaboration is not seen as an inflexible act, in contrast to smaller logistics service providers, who perceived such action too inflexible.

As stated by Balci and Cetin (2017, 1101) the spectrum of customers in the freight transport markets is voluminous: there are both individuals who ship small volumes sporadically and big corporations with perpetual large volumes. Therefore, understanding freight transport markets is complex due to an incoherent alignment of the customer demands. This statement supports the findings of this study which reveal very diverse perceptions regarding the importance of visibility as a service offering. In this study, it was discovered that the micro-sized logistics service providers, which have not invested in IT to enhance visibility, perceive that their customers do not value visibility. Instead, these logistics service providers considered flexibility and responsiveness, for instance, as more important service capabilities of a firm. Also, it was noticed by small-sized logistics service providers that many customers usually demand track and trace service in the stage of bidding. However, during in-transit of cargo, customers still prefer to contact traditionally by pursuing personal customer service and are not willing to receive email alerts of discrepancies emerging from cargo tracking portals. Moreover, it was founded that the medium-sized market leader finds tracking portal as an important tool for customers to follow their shipments and those customers are demanding track and trace as a service offering. One reason for these diverse perceptions towards the importance of visibility as a service offering could be that the logistics service providers of this study are serving different customer segments.

As previously noticed, not all customers consider visibility as an important service attribute and therefore are not demanding it. As stated by several authors (Andersson et al. 2011; Solakivi & Ojala 2017) it can be concluded that preferred service attributes differ significantly depending on customers and their needs. Mentzer et al. (2004, 19) state that to reach different customer segments in a global scale, successful firms create service strategies to customize their service offerings based on the demands of the target customer segments. This view supports the statement given by one logistics service provider who stated that their company would fall behind from the fashion logistics customer segment without track and trace portal. Therefore, it can be discerned that logistics service providers create strategies based on the needs of their target customer segments.

Furthermore, this study reveals that logistics service providers seek to find inimitable sources of competitiveness. For instance, expertise, global networks, different service



characteristics and IT-capabilities were considered as sources of competitiveness. Similar observations have been previously discovered by Wong and Karia (2010), who found out that logistics service providers are attempting to access strategic resources and bundle them to reach competitive advantages which are hard to imitate. These resources were linked to physical, human, information, knowledge and relational resources and could be for instance, logistics networks, transport assets, track and trace software and know-how of employees are accessed through different kinds of collaboration. Similarly, the findings of this study reveal that logistics service providers are focusing on different resources, which can be explained by resource-based view theory. Where one logistics service provider focuses strongly on IT-enabled track and trace portal as a competitive advantage, another logistics service provider sees expertise of employees, personalized customer service, flexibility and responsiveness as a competitive advantage and the third one perceives robust global networks as a strength.

To sum up, the author suggests that this study has provided several theoretical contributions to the current scientific literature in consequence of the empirical evidence emerging from this study. First, this study has provided novel empirical evidence regarding the actual adoption of visibility in multimodal maritime container transport chains. Second, this study has provided evidence on the benefits of visibility and the barriers to adopt visibility. Third, this study has contributed to the understanding of the perceived importance towards visibility as a service offering in the creation of competitive strategies. Finally, this study is, to the best of the author's knowledge, among the first scientific studies which has combined the perspective of logistics service providers together with the elements of multimodal maritime container transport chains, door-to-door visibility and the perceptions towards the noteworthiness of visibility as a service offering in the creation of competitive strategies. As the empirical findings have strengthened the existing scientific literature in these matters, the significance of the contributions can be perceived high.

## **5.2 Managerial implications**

Besides theoretical implications of this research, this study can be also perceived to contribute to the field of firms' strategic management. The author suggests that the findings of this study can perhaps provide valuable information for managers in strategic decision-

making regarding adoption of visibility. The focus of this study was to increase the holistic understanding of visibility as a source of competitiveness in multimodal maritime container transport chains in the perspective of logistics service providers. The empirical material revealed that even though the trend of technological capabilities and advancements which enable transparency are now afloat and emphasized in media, there are also other sources of competitiveness for firms.

### **5.3 Limitations of the study**

This study has several limitations. The purpose of this study was to investigate visibility in multimodal maritime container transport chains in the perspective of logistics service providers. The findings of this study stand for the statements and visions represented by informants of the selected logistics service providers. For instance, only one top player among ocean logistics service providers was interviewed, and the rest of the interviewed logistics service providers were differing with their size (in terms of turnover and number of employees, for instance). Due to a small sample size, the results should not be generalized to a wider population. The author therefore suggests that there would be more similar researches which focus on the same sample group in a wider extent. Also, it remained unclear how shipping lines are providing the data which is transferred to the freight forwarders through EDI-connections. It is uncertain whether the data is automatized or generated through timestamps typed by humans. The reliability of the data provided by feeder lines remained occult. Therefore, the data, which is considered as reliable, will remain in the European big ports where ocean container vessels operate.

Also, the issue in this study was the limited number of previous researches regarding transparency in multimodal transport chains in the perspective of logistics service providers. Fresh empirical studies were lacking, and majority of the “newest” studies were approximately 10 years old. Thus, it is slightly questionable whether those studies are still comparable due to a fast-paced change of technology. However, to have some previous comparable material, those studies were included in the theoretical background.

#### 5.4 Suggestions for future studies

It is alarming that there are big research gaps in previous scientific studies related to the practicalities of multimodal container transports and logistics service providers. For instance, it would be necessary to study more the sources of competitiveness in the perspective of logistics service providers. Empirical studies related to this area was lacking. Also, there were lack of novel studies which have focused especially to the barriers of adopting transparency in multimodal transport chains. The author did not find studies which would highlight the issue of fragmentation of freight markets due to a high number of subcontractors and the primitive IT-capabilities of those subcontractors. However, based on the findings of this study, these are prominent factors affecting to the adoption of ICT to establish fully transparent transport chains. Furthermore, it would be interesting to study the differences between market leaders and smaller logistics service providers in a wider extent and analyse the strategic decision-making between different-sized logistics service providers. In this study, the material regarding this aspect was scanty and superficial. For instance, the findings of this study show that small and medium-sized logistics service providers are utilizing digitalization in terms of encouraging customers to use automatized freight calculators and cargo tracking functions in their websites, whereas micro-sized firms are relying on their flexibility, rapid reflection and human-centric customer service rather than digitalization.

Additionally, it would be interesting to investigate customer demands in terms of multimodal freight transportation in more detail as the findings of this study reveal that customers are willing to have personal customer service despite the access to cargo tracking portal when finding out the status of the shipment. Also, some of the logistics service providers were not aware whether the incoming data is automatized real-time data or entered by a human afterwards. Therefore, it would be interesting to study the same topic by focusing on the perspective of shipping companies.

## 6 SUMMARY

It seems that currently, companies regardless the industry or markets are living in the rise of an economic tide which acts like a buffer to reshape business strategies of firms. The objective of this study was to investigate visibility in multimodal container transport chains orchestrated by logistics service providers. To achieve the research objective, four research sub-questions were set: one disclosing how visibility in multimodal maritime container transport chain appears currently, one to discover the benefits and opportunities emerged from visibility, one to reveal the barriers which are hindering the adoption of visibility and finally, the perceptions of logistics service providers towards the importance of visibility as a service offering in the creation of competitive strategies.

Initial framework was constructed by bouncing between the empirical results and the evidence from academic literature. Surprisingly, scientific literature was lacking novel empirical studies related to the actual adoption of tools and strategies enhancing visibility among logistics service providers. Five logistics service providers situated in Finland were selected in the data collection. It can be pointed out that due to an increasing boom of shippers to outsource their transport and logistics operations to logistics service providers, which are expected to arrange tailored and cost-efficient solutions for carriage of goods in global contexts by combining different modes of transport, this research field should undoubtedly be more investigated in the near future.

Findings reveal that the medium-sized market leader and small-sized logistics service providers perceive transparent transport chains more important compared to micro-sized firms. However, whereas market leader aims for long-term collaborations, micro-sized and one small logistics service providers see such scenario too binding. This is caused by the motivations behind: due to the massive volumes and allocations needed by the market leader, micro and one small-sized logistics service providers provide tailored and flexible solutions for customers and select collaborators case-by-case by ranging them according to lowest prices. This kind of strategy for collaboration practices hinders the adoption of IT-integration between different parties. Visibility and transparency of transport chains can be considered as an output of the whole ecosystem, and therefore it requires long-term strategic relationships between the stakeholders (such as shipping lines and customers) in the organizations. This is accomplished by the market leader in the industry. How-

ever, the interviewed logistics service providers which are doing business with small foreign subcontractors with primitive ICT-systems (i.e. pen and paper) in the country of destination, perceive full visibility of multimodal maritime container transport chains as extremely challenging. However, those logistics service providers identified other than IT as a source of competitive advantage.

There is a gaping hole in the current scientific literature in terms of fresh empirical studies related to the area of this research. This study is one of the first studies combining the relationships of multimodal maritime container transport chains and the transparency as a source of competitiveness in the perspective of logistics service providers. Therefore, it is suggested that this unique field of research would be further investigated. Additionally, the results of this study can be also considered as soothing for the managers among logistics service provider companies, who could be coping with daily distress caused by the puny margins and perpetual growing demands and competition in the freight transport markets.

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## APPENDIX

Semi-structured interview questions:

Q1: How transparency appears currently in the company's multimodal door-to-door maritime container transport chain?

Q2: Have you adopted any technological advancements such as RFID tags, robotics, artificial intelligence or ERP?

Q3: What kind of stakeholders are involved in the multimodal container transport chain?

Q4: What kind of benefits and opportunities multimodal transparent transport chains generate?

Q5: What are the drivers to increase visibility in transport chains?

Q6: How do you see the role of door-to-door transparency in customer's selection of a freight forwarder?

Q7: What are the barriers in the adoption of tools and actions to increase transparency?

Q8: How these barriers could be exceeded?

Q9: How do you differentiate from the competitors in the freight forwarding industry?

Q10: What kinds of customers are demanding transparency?

Q11: Do you believe that big IT-investments which enhance transparency are worthwhile in terms of added value and customer satisfaction?

Q12: How do you see the future of transparent multimodal transport chains? Is it realistic to create a completely transparent chain?